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ALASKA AGRICULTURAL EXPERIMENT STATIONS.

C. C. GEORGESON, Special Agent in Charge.

ANNUAL REPORT

OF

ALASKA AGRICULTURAL EXPERIMENT STATIONS

FOR

1908.

UNDER THE SUPERVISION OF

OFFICE OF EXPERIMENT STATIONS,

U. S. DEPARTMENT OF AGRICULTURE.

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ALASKA AGRICULTURAL EXPERIMENT STATIONS, SITKA, COPPER CENTER, RAMPART, FAIRBANKS, AND KODIAK.

[Under the supervision of A. C. True, Director of the Office of Experiment Stations, United States Department of Agriculture.]

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LETTER OF TRANSMITTAL.

SITKA, ALASKA, *February 9, 1909.*

SIR: I have the honor to submit herewith a report on the work of the Alaska Agricultural Experiment Stations for the year 1908.

Respectfully,

C. C. GEORGESON,
Special Agent in Charge of Alaska Investigations.

Dr. A. C. TRUE,
Director, Office of Experiment Stations,
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Publication recommended.
A. C. TRUE, *Director.*

Publication authorized.
JAMES WILSON, *Secretary of Agriculture.*

CONTENTS.

	Page
Summary of work for the season	7
Interest awakening	8
The weather	8
Work at the Sitka Station	9
Apples	9
Cherries and plums	11
Bush fruits	11
Strawberries	12
Potatoes	13
Work at the Rampart Station	14
Progress at the Fairbanks Station	15
Work at the Copper Center Station	17
Closing the Copper Center Station	18
Progress at the Kodiak Live-Stock Station	18
Kenai Station closed	20
Hot Springs Farm	21
Notes on nursery stock and vegetables at the Sitka Station	21
Apples	22
Cherries	25
Plums	26
Currants	26
Gooseberries	27
Raspberries	28
Strawberries	28
Potatoes in brewery lot	30
Cabbage	31
Cauliflower	31
Kale	31
Turnips	31
Ornamentals	32
Report on work at the Rampart Station	32
Climatic conditions	32
Work of the season	33
Grain crops	33
Winter grain	34
Spring grain	35
Grasses and forage crops	39
Potatoes	40
Garden crops	41
Nursery stock	42
Flowers	43
Report of work at the Fairbanks Station	43
Vegetables	44
Grain crops	45

Page.
Report of work at the Copper Center Station 48
Climatic conditions 48
Pedigree plant breeding 48
New creations 49
Effect of frosts 49
Vegetables 49
Field crops 52
Horticulture 56
Indian gardens 56
Other work 56
List of plants collected in Alaska during 1908 57
Report of work at the Kodiak Live-Stock and Breeding Station 58
Work of the season 58
Climatic conditions from a stockman's standpoint 59
The cattle at the station 61
The wintering of the herd 61
Loss among cattle in Alaska 63
Haymaking and putting up silage 64
Work at the Frye Ranch 65
Reports from the seed distribution 65
Weather reports for Alaska 72

ILLUSTRATIONS.

Page.
PLATE I. Twelve varieties of potatoes, Sitka Station 14
II. Fig. 1.—Grain in shock, Rampart Station. Fig. 2.—Selected early heads of grains, Rampart Station 14
III. Fig. 1.—Stump puller at work, Rampart Station. Fig. 2.—Galloway calves in pasture, Kodiak Station 16
IV. Fig. 1.—View of watermelons and muskmelons in open, Hot Springs Farm. Fig. 2.—Sweet corn, Hot Springs Farm 22
V. Fig. 1.—Red Cross currant. Fig. 2.—Whitesmith gooseberry 28
VI. Fig. 1.—Oats, Rampart Station. Fig. 2.—Buckwheat, Rampart Station 38
VII. Fig. 1.—Building site and character of timber, Fairbanks Station. Fig. 2.—Breaking virgin soil, Fairbanks Station 44
VIII. Fig. 1.—Yakutsk barley. Fig. 2.—Chittyna barley. Fig. 3.—Crossbred barley, bearded. Fig. 4.—Crossbred barley, smooth 48

ANNUAL REPORT OF ALASKA AGRICULTURAL EXPERIMENT STATIONS FOR 1908.

SUMMARY OF WORK FOR THE SEASON.

By C. C. Georgeson, *Special Agent in Charge.*

Satisfactory progress has been made at all of the stations. The development of the new station at Fairbanks is well under way. At the Kodiak Live Stock and Breeding Station large strides were made toward completing arrangements for the proper handling of the herd. The grain crops at the Rampart Station were all that could be wished. At the Copper Center Station some valuable results were obtained in spite of destructive frosts. At the Sitka Station the horticultural work progressed favorably, and the Kenai Station was closed, the live stock and equipment being transferred to the Kodiak Station in accordance with plans outlined in the report of last year. Each passing year adds proof to the proposition that Alaska has potential resources for the support of a large population. The conditions are unique, however. The farmer in Alaska can not plow and plant with the same assurance that he will harvest a crop that he can below latitude 49° N. Alaska is on the borderland of possibilities. Success and failure are about evenly balanced. Nature is stern and uncompromising and we must submit to the conditions she imposes. To learn what these conditions are and how to meet them; to find out what can be grown and how to grow it; to develop suitable varieties of useful crops; to adapt domestic animals to Nature's demands; and to push the line of successful agriculture to the border of the Arctic Circle is the object of these investigations.

Progress is slow in these investigations. A body of most valuable data on the climate of Alaska is being collected, including the temperature, the rainfall, and the variation of the seasons at many different points, and a large number of varieties of grains and vegetables is being tested, or has been tested, and their adaptability to different regions has been studied. A fair start has been made in the selection and breeding of plants, and in the pioneer work of establishing stations and clearing and subduing the soil much progress has been made.

A few things have been demonstrated beyond a peradventure. Perhaps the most important fact proved is that Alaska is an agricultural country. It is but a short time since this claim was discredited and treated with ridicule. Another fact that has been proved is that cattle feed can be produced in any quantity; that is to say, while grains may be injured by frost in certain regions, they can always be grown to a stage at which they will make nutritious hay, and the native grasses can maintain live stock in excellent condition in summer, and they make good hay and silage for winter feed. Indeed, the silage from one species of grass, beach rye (*Elymus mollis*), proved on analysis to be equal to clover hay in nutritive qualities. Potatoes, cabbage, cauliflower, rhubarb, turnips, lettuce, and, in short, all the hardy vegetables can be grown to perfection up to and even within the Arctic Circle, as has been proved by thousands of settlers.

A legitimate question and one which is frequently asked is: Why, in view of the productive capacity of the country and with the prevailing high prices for farm produce, is Alaska not rapidly settled with farmers? The answer is that the economic conditions prevent settlement. Alaska can not be settled before railroads and wagon roads are built and transportation rates are reduced. Under present conditions but few farmers can afford to go to Alaska with their families, live stock, and equipment. The expense would equal the cost of a farm in the States.

INTEREST AWAKENING.

Many inquiries are received from prospective settlers, who want to know about the country and the best place to undertake farming. This is an indication that there is a growing interest in Alaska and its possibilities. But most inquirers are deterred when they learn the cost of transportation.

The Alaska road commission, headed by Maj. W. T. Richardson, is doing much to reduce this cost in opening roads and trails into regions undergoing development. Excellent progress is being made, and at this stage the Government can undertake no more important work. Road building with private funds is out of the question, except in the case of a few corporations with large mining interests. The home seeker, the settler, the miner, the men who subdue the wilderness, must depend on the Government for roads.

THE WEATHER.

The condition of the weather for any given season will always be a measure of the farmers' success for that season. The one most essential factor is sunshine. If a large portion of the growing season is rainy, cloudy, or overcast, the crops fail. When, on the other

hand, a large portion of the growing season has abundant sunshine, the season is warm and pleasant, the soil becomes warm, and crops respond with more vigorous growth. The season of 1908 has on the whole been favorable to the farmer both in the coast region and in the interior. In both regions the spring was late and cloudy, the soil did not dry out promptly, and seeding was therefore late; but the middle and latter part of the summer were favorable and the results were correspondingly satisfactory. Much rain means little sunshine.

At Sitka the total rainfall for May, June, July, and August was 16.22 inches during 1908. In 1907 the total rainfall for the same months was 24.76 inches, or 8.54 more than in 1908. In 1906 the total rainfall for the same months was 18.91 inches, or 2.69 more than for 1908. This diminished rainfall for the past season accounts for the fact that the potatoes, cabbage, cauliflower, and root crops of various kinds gave large yields and were of better quality than in the two preceding years.

In the interior of Alaska the conditions were about the same; that is, the rainfall was lighter than the average and there was a correspondingly greater amount of sunshine, which hastened growth and maturity of the crops. This reduction in rainfall during the growing season had the advantage that the soil could be worked better, which in turn facilitated growth and contributed to the good results. The warm, dry summer had the further advantage of making it possible to clear land with greater dispatch and with less expense than when the summer is wet, for the reason that the moss could be burned without first digging it up. Fire is the most economical agent that can be employed in clearing land. By reason of the dry summer, clearing went forward rapidly at both the Rampart and the Fairbanks experiment stations.

WORK AT THE SITKA STATION.

The plans outlined in former reports have been followed. The work at Sitka is chiefly along horticultural lines. Fruit trees, mostly apples, are propagated and attempts made to grow them; also some cherries and plums and berry bushes, such as currants, gooseberries, and raspberries in many varieties. The past season there was no surplus nursery stock for distribution, and therefore none was sent out for trial among settlers as in former years.

APPLES.

There are under cultivation 46 varieties of apples, including crabs, at the Sitka Station. They are all young trees and none of them have borne fruit. Nearly all of them are early summer varieties in the States, and it is evident that none other will mature fruit in

Alaska. Indeed, it is yet an unsettled question whether apples of any sort can be successfully grown in Alaska. The more their behavior is studied the more probable it seems that if apples can be ripened at all they will be limited to a very few varieties, and these will probably be varieties which are hybrids of the crab. They must also be varieties which are adapted to the peculiar conditions—the wet climate and the more or less peaty and sour soil. There is in the coast country of Alaska a wild crab apple which was described in the report for 1906. It is scarcely more than a bush, forms thickets in many places, and seems to thrive best near salt water. It seldom forms a single trunk like the apple, but sends up a number of shoots from the roots. Some of these shoots will form short trunks which occasionally reach the size of 6 or 8 inches in diameter, but this is rare. In early June it bears a wealth of sweet-smelling blossoms and these are followed by clusters of tiny apples, oval in shape and but little larger than large peas, though sometimes reaching the size of a small hazelnut. These tiny fruits have all the parts of perfect apples and make most excellent jelly. Experiments are in progress using the roots of this species for stocks on which to graft early summer apples, but none of the trees are old enough to give indication of their future usefulness. A hybrid between this native species and an early summer apple of good quality might possibly mature in southeastern Alaska. To produce such a hybrid many blossoms of the native crab were cross-fertilized last spring with pollen of several varieties of early apples, and many of them set fruit. The object was to obtain seeds which might partake of the nature of both parents and thus produce a larger apple while retaining the hardiness of the native crab. This experiment was a failure because the Indian women gathered the apples and made jelly of them, along with the general crop, although each twig which bore hybridized apples was labeled and the cluster of fruit protected by a paper bag. If apple growing ever proves a success in any portion of Alaska, it must come through the development of varieties which are suited to the climate.

At the town of Wrangell are some three or four apple trees which have borne fruit for several years, but the fruit never matures, although it develops sufficiently to be used for cooking. The varieties are unknown. They are either chance seedlings or they have been planted without regard to variety characteristics.

Of the varieties at the Sitka Station those which are almost certain to be failures can now be eliminated; these are Tetofski, Red Astrachan, Duchess of Oldenburg, Lowell, Iowa Beauty, Early Harvest, Green Sweet, Williams Favorite, Primate, Fannie, Sops of Wine, Summer Rose, and Early Strawberry.

The following are among those which at this time give some promise of success: Whitney (crab), Yellow Transparent, Peerless, Martha (crab), Sylvan Sweet (crab), Brier Sweet (crab), Transcendent (crab), Hibernal, Hyslop (crab), Raspberry, Red June, Patten, Dart, and Greenwood Crab.

It will be noticed that most of these are crab apples, and as a class crabs will do better than those which have no crab blood. There are at the station a few dwarf trees obtained from an eastern nursery. Of these Golden Sweet and Sweet Bough are practically the only two which give much promise. These same trees, if they had been planted for the same length of time south of the forty-ninth parallel, would have been bearing by this time. In Alaska their growth is slow, the yearly shoots seldom exceeding 1 foot in length, and most of them seem to make this growth under protest. The Hyslop has bloomed for the past two years, but no fruit was set. The work of developing varieties by hybridization should be continued, as this is almost certainly the only means through which varieties can be developed which will succeed in Alaska.

CHERRIES AND PLUMS.

At the Sitka Station are four varieties of sour cherries, namely: Early Richmond, Dyehouse, English Morello, and Ostheim. They have all borne a little fruit and give promise of being of value. A merchant in Sitka has two cherry trees of a sweet variety. The trees grow well and bloom profusely, but have so far matured very few cherries. He also has a Green Gage plum tree which grows well, blooms, and sets fruit, but the fruit is only three-fourths normal size when the fall weather stops further growth.

BUSH FRUITS.

In the notes which follow several varieties of plums are enumerated. The trees are all too small to bear fruit. It is therefore too early to pass any judgment on them whatever, except to note that most of them make fairly good growth.

It has frequently been noted in these reports that the currants are a magnificent success in Alaska. The red currant grows wild in many sections, particularly on the Kenai Peninsula and in sheltered valleys throughout the coast range. A number of these wild currants were transplanted to the experiment station, but for some reason they never do as well under culture as they do in their native haunts, where they are free-growing bushes, which usually yield a moderate amount of fruit. One peculiarity of this fruit is that a large percentage of the berries are pear shaped. This is not confined to particular bushes or even to particular clusters on the same bush.

The pear-shaped berries occur apparently indiscriminately, a few here and there, or at times they may even form a preponderance of the fruit on certain bushes, but they are never found to be all pear shaped on the same bush.

The cultivated varieties of the currant which have been tried all do well and yield abundantly. The variety known as the "Red Cross" is perhaps the most prolific of the few sorts grown. Their behavior is noted in detail elsewhere. An illustration of the bush in fruit is presented herewith (Pl. V, fig. 1, p. 28).

Gooseberries are likewise a pronounced success in the coast region of Alaska. There are not many sorts at the station, but all do well. The varieties of American origin are nearly a month earlier than those of English origin. Of the latter class the Whitesmith is perhaps the most promising. It produces an abundance of very large fruit. A photograph of a bush of this variety is given herewith (Pl. V, fig. 2, p. 28).

Raspberries are also indigenous to Alaska, but the wild raspberry produces only a small fruit and yields sparingly. It is therefore desirable that better varieties should be introduced. A few cultivated sorts are growing at the station. Of these the Cuthbert is decidedly the best. It is a free grower and ordinarily yields full crops of large berries. But the Cuthbert is not hardy in the interior. It is therefore desirable that a variety should be developed which is better suited to the conditions. With this end in view the Cuthbert was fertilized with pollen from the salmon berry (*Rubus spectabilis*), and several hundred hybrid plants were produced. Last year one of them, the first to fruit, had a few berries, but they were small and not equal to either the raspberry or the salmon berry. In leaf these hybrids for the most part resemble the salmon berry. Black raspberries are a failure in Alaska, and so are blackberries. It is useless for settlers to spend time and money experimenting with them.

STRAWBERRIES.

The cultivated strawberry can be grown with moderate success in Alaska, but all varieties do not do equally well. There are, in fact, probably only a very few varieties which are not liable to failure. The regions of successful culture of the strawberry have not been determined. While it is known that hardy sorts can be grown in the coast region, it is not known how far they can be made a success in the interior; but it seems probable that wherever the snowfall amounts to 2½ feet or more, as a covering for the entire winter, the strawberry can be successfully grown. Strawberries have been seen at Fairbanks which lived through the winter of 1907–8. It has been mentioned in former reports that there are two wild species of straw-

berries in Alaska. The one in the coast region is supposed to be *Fragaria chilœnsis*, while the one in the interior is as yet not determined. These two species have, of course, the valuable quality of hardiness, and the species in the coast region produces a berry which may be called large for a wild species, specimens occurring that are over an inch in length, very firm, of excellent flavor, and a delicious aroma. It was thought that if these qualities could be united with some of the other qualities of the cultivated berry, particularly large size and productiveness, then Alaska would have a strawberry eminently suited to the country and at the same time equal to the strawberry found in more favored regions. To this end some of the cultivated varieties were hybridized with pollen from the wild coast species, and about 2,000 plants are growing as a result of this hybridization. In 1908, 33 of these hybrid plants bloomed for the first time, but the berries they produced were in no way improvements on even the wild berry. This coming summer it is hoped that many more of them may bloom and set fruit. They will be watched with interest. It may be noted that in vigor, growth, and size and shape of leaf nearly all these hybrid plants resemble the male parent, the wild strawberry. It might be expected that the wild, unaltered species would naturally be more prepotent than the cultivated berry whose constitution has already been altered by culture.

In 1905 a number of plants of the wild interior species were brought to the Sitka Station, where they were planted and given every attention. Only three plants were alive a year later, and they were doing poorly. On the other hand, plants of the same lot were set in cultivated ground at the Rampart Station, on the Yukon, and there they flourished magnificently. The past summer the bed was a tangle of vigorous plants, which, however, showed very little fruit. While this species is adapted to the dry interior, it is not at all adapted to the moist coast region.

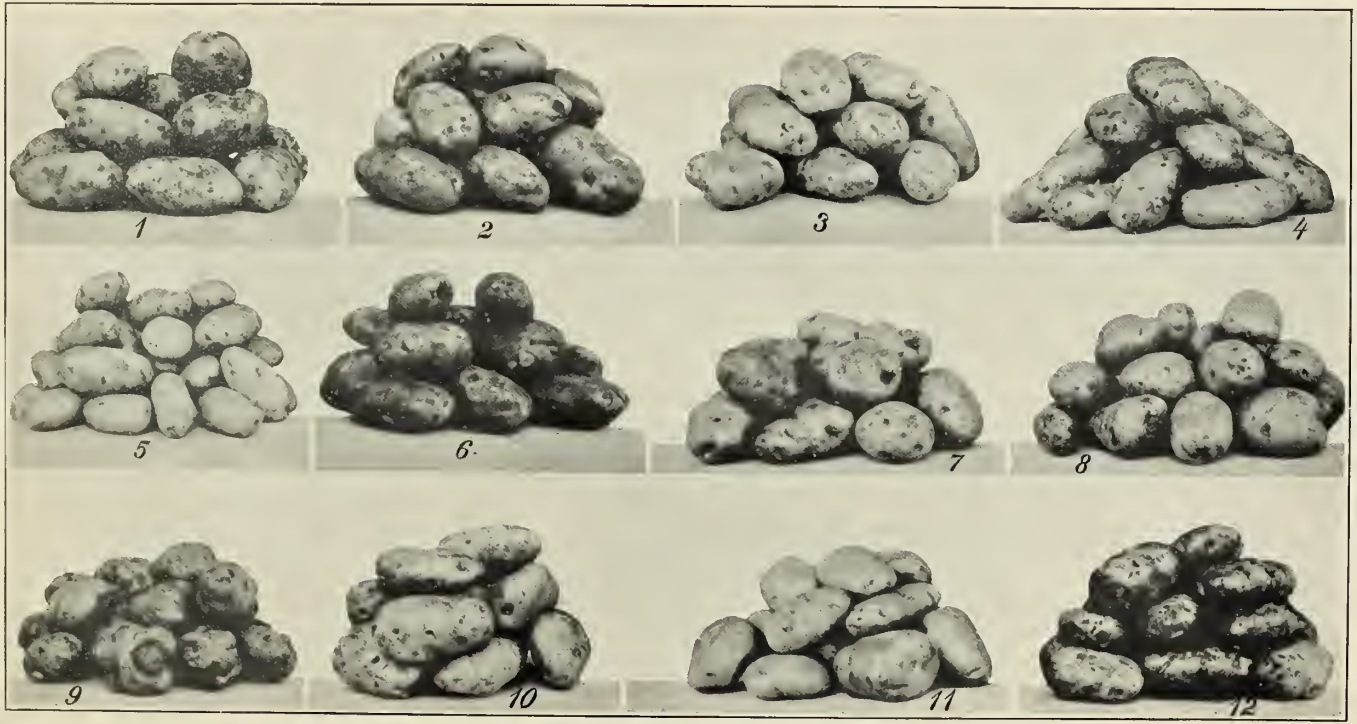
POTATOES.

For three years past several varieties of potatoes have been grown at the Sitka Station, with a view to determining which were the most reliable for that climate. The results have not been uniform; that is to say, a given variety does not take the same rank as a yielder every year, due partly to variation in rainfall during the growing season, but chiefly due to variation in the soil on which it is grown. It can, therefore, not be said with absolute certainty that a given variety should be placed above all others; but it is easy enough to pick a dozen sorts which rank among the most desirable in point of yield and quality. Illustrations of 12 varieties grown at the Sitka Station the past season are submitted herewith (Pl. I).

In the point of desirability, considering both yield and quality, they would probably rank in the following order: 1, Gold Coin; 2, Early Michigan; 3, Extra Early Ohio; 4, Carman No. 3; 5, Freeman; 6, Garfield; 7, Norway No. 1; 8, Norway No. 2; 9, Norway No. 3; 10, Irish Cobbler; 11, Banner; and 12, White Mammoth.

WORK AT THE RAMPART STATION.

The line of work described in former reports from Rampart was continued the past season. This station, which is less than a degree from the Arctic Circle, has been the most successful grain-growing station. For some reason which has not yet been satisfactorily explained killing frosts do not occur there so early in the season as they do in the Copper River Valley. In consequence of this all grains have matured. The past season, out of 67 varieties grown at this station, only 2 failed to mature seed sufficiently to grow. In early August it was an unalloyed pleasure to observe the various grain plats and note their behavior; the crops had made excellent growth and were of normal height, with heavy heads of grain fully developed. By August 6 several of the early barleys had begun to mature. Attention is called to the detailed report by the superintendent, Mr. J. W. Gasser, submitted herewith (p. 32). Grain growing is the most important work at this station; the attempt is being made to develop early maturing, heavy yielding varieties of barley, oats, wheat, and rye. Through the courtesy of the Bureau of Plant Industry small samples of many varieties of cereals from foreign countries were secured, especially from Siberia, northern Russia, and high altitudes in the Himalaya Mountains. These grains have done uniformly well at the Rampart Station. The method of selection followed at the Rampart Station is, briefly, as follows: A new variety of grain is carefully watched, and when it begins to ripen the earliest heads which are also well formed are marked, and when fully ripe they are cut and marked with the date of maturity and other pertinent notes. These heads are laid away and during the winter studied individually. A few of the best of the several heads are selected for seeding. The seed in each head is planted in a row by itself, which is properly labeled, and again the process of selecting the earliest maturing heads is continued. Alaska must have grains which will attain normal development and mature during the first half of August, so as to avoid the early fall frosts, which occur by the middle of August in several regions of Alaska, more particularly in the Copper River country. For the present, earliness must take precedence over all other qualities. When this characteristic has once been established selections will be made for vigorous growth, heavy yields, and other desirable qualities. Plate II, figure 1, shows small samples of selected varieties in shock, and Plate II, figure 2, selected early heads.



TWELVE VARIETIES OF POTATOES, SITKA STATION.

1, Gold Coin; 2, Early Michigan; 3, Extra Early Ohio; 4, Carman No. 3; 5, Freeman; 6, Garfield; 7, Norway No. 1; 8, Norway No. 2; 9, Norway No. 3; 10, Irish Cobbler; 11, Banner; 12, White Mammoth.

FIG. 1.—GRAIN IN SHOCK, RAMPART STATION.

FIG. 2.—SELECTED EARLY HEADS OF GRAINS, RAMPART STATION.

Superintendent Gasser has managed this station with energy and skill, and the results are most satisfactory. There is much variation in the soil as to fertility, moisture, and exposure, and the success of this work depends largely on the planting of the given varieties in the right situation.

There were 7 acres in crops of many kinds the past season. During the summer 8 acres more were cleared and broken and will be available for crops next year. The season was favorable for clearing land. The rainfall was less than usual during the middle of the summer, and the moss which covers the ground everywhere in that region therefore dried up sufficiently to burn. A small stump puller (Pl. III, fig. 1), operated by one horse, has proved to be an efficient implement for removing all stumps which are not destroyed by fire or which can not be knocked out speedily with hand tools. These stumps are then piled together and burned by the aid of the small limbs and other rubbish.

The work of clearing will be continued at this station until there are at least 50 acres under culture, in order that operations on a sufficiently large scale to demonstrate the practicability of farming in that region may be established.

PROGRESS AT THE FAIRBANKS STATION.

Mr. J. W. Neal, who was formerly superintendent of the Copper Center Station, is now superintendent of the Fairbanks Station. He arrived there in March, 1908, while the snow was still deep on the ground, and at once began preparation for spring work. Ten acres had been cleared in the summer of 1907. This was fenced, a temporary barn was put up for the teams, and a cabin was made habitable for temporary use. The entire equipment, which was in storage at Fairbanks, was hauled to the station and some clearing was begun. The seeding of the 10 acres, which had been cleared and broken, was late, due to the fact that the melting snow water did not drain off readily. The ground was still frozen underneath and the only way the surface water could escape was to run off, a point which had not been foreseen in the plowing. The seeding, which should have been done in the middle of May, was not completed until two weeks later, and in consequence of this the crops were late in maturing. The growth of the crops was characteristic of all grain crops sown on new land. It was short, except in the places where brush piles had been burned. In these places the ashes stimulated growth, and the heat had also melted the ice in the ground for some distance deeper than where there had been no burnings, and the soil itself was improved by the heat. In these places barley and oats stood 4 feet high, while outside the burnt spots these grains were only 2 feet

high. This simply confirms the experience of farmers everywhere in Alaska when new ground is put under culture. The greater portion of the several varieties of barley and oats matured in spite of the late season.

The energies of the station force were devoted largely to clearing land, and a total area of 60 acres is now available for cultivation. The plan is to continue the clearing until there are 400 or 500 acres under cultivation, in order that farming may be conducted on a reasonably large scale. It is deemed important to demonstrate whether farming can be made to pay in that region; therefore such crops as the local market may demand will be grown, and the proceeds from the sale of these crops, after having been deposited in the United States Treasury, will be applied to the running expenses of the farm. Nearly all the land which is now cleared has a northern slope. This is a disadvantage, but this slope was cleared for the reason that it had a light growth of timber and underbrush and could therefore be put under culture at less expense and in less time than heavier timbered land on the south slope. The best soil has a southern slope, but it is covered with heavy birch and spruce timber. To clear this land will take a longer time and cost more than to clear the less favorable, but lighter timbered, areas. A building site was selected and a barn 32 by 30 feet and 16 feet to the eaves has been built. The lower story is of logs and the upper story of frame construction. During the coming summer a dwelling house for the superintendent and shelter for the implements must be provided, and also a well and a frost-proof cellar.

Thirty-two varieties of potatoes were planted in the beginning of June. They did not make a large growth in this new ground, but the yields were sufficient to provide ample seed for the next year. Through the courtesy of the Alaska division of the Geological Survey, in charge of Mr. Alfred H. Brooks, the experiment station at Fairbanks has again received four of their horses, which were transferred to the station at the close of the season's work. This has saved the expense of purchasing and transporting horses from the States, for which grateful acknowledgment is made.

All the station horses, now seven in number, were placed with a stage company for the winter to work for their feed. There was no chance to put up more than a few tons of hay, about the amount required for spring work, and it would have been too expensive to buy feed for these horses and to let them stand in idleness all winter. Another year there will be feed enough raised for all live stock at the station.

The breeding experiments with grain which have gone on for the past two years at the Rampart Station and at the Copper Center Station will also be taken up at Fairbanks.

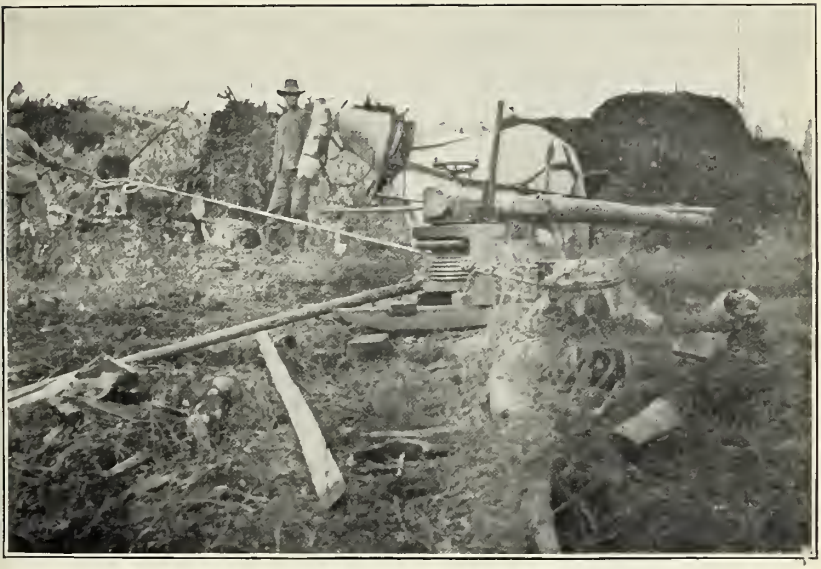


FIG. 1.—STUMP PULLER AT WORK, RAMPART STATION.

FIG. 2.—GALLOWAY CALVES IN PASTURE, KODIAK STATION.

Plate VII, figure 1, page 44, shows a view of the site which has been selected for the station buildings. It is on a gentle slope, facing south. The white tree trunks shown in the background are birch, which covers the south slope. Figure 2 shows the breaking of the virgin soil.

WORK AT THE COPPER CENTER STATION.

The past season was more unfavorable in the Copper River Valley than at any time since work began there in 1902. Mr. C. W. H. Heideman, superintendent of the station, has done excellent work along the lines of selecting and breeding varieties of grain, but the major portion of his work was lost by frost. There was frost in every month of the year. The most destructive frost, however, occurred July 21, when the temperature fell to 23° F., as indicated by a minimum thermometer placed a short distance above ground. Potato vines and all equally tender plants were killed to the ground, and all the grains and even the hardy vegetables suffered much.

The early part of the summer was so dry that much of the seed did not germinate until late. There was only one-half inch of rainfall from April 1 to July 11. Such of the crops as could revive after the frost of July 21 started to grow again, but were further nipped by frosts August 4 and 23. In spite of all this, Mr. Heideman attained a certain degree of success. Small plats of barley matured, namely, the varieties known as Pamir, Champion, and Manshury. Yakutsk barley and a Russian variety known as S. P. I. No. 2786 [a] partly matured. Of the oats small plats matured of the Finnish Black and S. P. I. No. 15857. No wheat of any kind matured.

It was noted that grain which was in the dough stage was more sensitive to the frost than grain which was in the milk stage. Mr. Heideman last year cross-fertilized Pamir and Champion barleys, the former being bearded and the latter beardless. From these crosses 17 seeds were produced, 15 of which produced plants this year. Some of these crossbred plants promise to be better than either of the parents. It would be highly desirable to develop a vigorous, large-headed, productive, beardless variety of barley, and at least one of these plants shows a beardless barley as a result of the cross. (Pl. VIII, fig. 4, p. 48.) Plate VIII, figure 3, shows a bearded barley, a result of the same cross.

Aside from the experiments with grains and vegetables, Mr. Heideman seeded a number of plats with native Alaskan grasses and legumes, seed of which he collected a year ago. These plats were seeded in the spring, but the dry weather was a serious drawback to

[a] S. P. I. refers to importations by the U. S. Department of Agriculture, Section of Seed and Plant Introduction.

the germination and the growth of the plants. Some of these grasses promise fairly well, although no conclusion can be reached in one year.

CLOSING THE COPPER CENTER STATION.

It is recommended that the agricultural experiment station at Copper Center be temporarily closed. This recommendation is made for several reasons. First, it is an expensive station to operate, in that all supplies needed must be hauled in over the trail from Valdez. If sent in winter, they must be hauled on a sled, at a cost of 10 cents a pound, while if sent in the summer time they must be carried on horseback at a cost of 50 cents a pound. Second, it has already been proved that grain growing is precarious in that valley. Out of the six crops grown there only one matured perfectly and two were but slightly damaged. Three crops were failures. Third, the funds are needed in the development of the Fairbanks Station, where farming gives promise of being both successful and profitable. The equipment, which is of sufficient value to transfer to Fairbanks Station, should be hauled there this winter. When a railway is constructed through the Copper River Valley and it is possible to ship freight at a reasonable cost, then, if deemed desirable, work can be resumed at this station, or perhaps at another station higher up in the valley, or at any point where a permanent settlement is made.

PROGRESS AT THE KODIAK LIVE-STOCK STATION.

The Kodiak Station was visited in May. On this visit plans were discussed with the superintendent and arrangements were made for sawing the lumber needed during the present season in erecting new buildings. Through the courtesy of the Bureau of Fisheries of the Department of Commerce and Labor, the station was granted the use of a sawmill which belongs to that Bureau and which had been erected at Letnik Bay, on Afognak Island, where the Bureau was building a salmon hatchery. The use of this sawmill proved a great advantage. If not for this accommodation, it would have been necessary to ship the lumber from Seattle at a cost of several dollars per thousand feet—more than the actual cost of cutting it by means of this sawmill.

The month of May was cold and rainy. It was a hard month on the cattle, and in that region the month of May will always be the most difficult month for stockmen, for the reason that the new grass has not started and the cattle will browse on the old, dead grass, which has lost all its nutritive value and become indigestible. Three cows were lost from impaction of the manifolds owing to their eating this old grass. The loss was itself a valuable lesson in that it demon-

strated the necessity for keeping the cattle up and feeding them hay or silage until the new grass starts.

Owing to the lack of pasture in the neighborhood of Kodiak it was decided to divide the herd and to keep only the best milkers and such of the young stock and other animals, which for any reason should be under the eye of the superintendent, on the reservation at Kodiak, and to remove the rest of the herd to the reservation at Calsinsky Bay, 15 miles from Kodiak. A tract of 12 square miles of excellent pasture land has been reserved for this purpose. It was further decided to build a dairy and hay barn with room for 16 cows, and a small dairy building, at Kodiak, and at Calsinsky Bay to erect a hay barn, a cattle shed, a silo, and a cottage for a herdsman, which was all that could be undertaken for this year.

The superintendent, Mr. M. D. Snodgrass, prosecuted the work with energy and care. Although handicapped both by lack of funds and by lack of competent and sufficient help, and also by the late arrival of the stave silo, he completed all but the dairy building, so that they can be used. This was in addition to the daily work of caring for the herd, transferring the greater portion of it to Calsinsky Bay, putting up 70 tons of hay and 65 tons of silage, not to mention some fencing and the clearing of 40 acres for meadow, and building a road over the most frequented portion of the reservation at Kodiak. The buildings are of the following dimensions: At Calsinsky Bay the hay barn is 24 by 50 feet and fitted with hay fork, carrier, and track. The cattle shed is 24 by 100 feet, open to the south. This affords the only shelter for the cattle which are kept at that place. The herdsman's cottage is 16 by 32 feet, and the stave silo, which was purchased at Olympia, Wash., and shipped to Kodiak, is 16 feet high by 20 feet in diameter, with a capacity of 100 tons. The object in making it so wide and only 16 feet high was to permit of doubling its capacity by raising the roof and adding 16 feet more when the size of the herd demands an increase in feed. It is erected on a solid cement foundation. At Kodiak the dairy and hay barn is 30 by 60 feet; it has a cement foundation and corrugated-iron roof. The small dairy building, 16 by 32 feet, which it is planned to build at Kodiak, has not yet been constructed. The herd was kept on pasture at Kodiak all summer and did remarkably well. Owing to the fact that work was begun without any hay ahead, it was necessary to purchase all the feed required for last winter. The cattle were fed only when snow covered the ground so that they could not pasture. They ran out all winter, and the amount of feed given them was comparatively small. Thirteen calves were born during the spring and summer, 6 bulls and 6 heifers of pure-bred Galloways and 1 grade from a native cow. That portion of the herd which was to be wintered at Calsinsky Bay was driven there overland in October

after all arrangements for their care had been made. The second winter was begun with the conviction that cattle can stand the climate out of doors with only an open shed for shelter if there is a sufficient supply of native hay and silage on hand. The silo is filled with the so-called beach rye (*Elymus mollis*), which is indigenous to the coast region throughout Alaska. It is a coarse, nutritious grass which has been proved by experiments at Sitka admirably adapted for silage. A lighter with a capacity of 12 tons was built to be used in carrying lumber and other material from Kodiak to Calsinsky Bay. The station needs a good-sized gasoline launch for its work, and it is hoped that one may be procured in the near future. Plate III, figure 2, page 16, shows some calves dropped at Kodiak.

KENAI STATION CLOSED.

As recommended in the previous report, the Kenai Experiment Station has been closed and the equipment and live stock transferred to the new station at Kodiak. Work at the Kenai Station was begun in 1899 and continued until May, 1908. The station was located at Kenai, on the Kenai Peninsula, Cook Inlet, for the reason that it appeared to be a promising location for successful agricultural development, and at that time there was a prospect that this region would be rapidly settled. However, this early promise was not fulfilled. The coal beds at Homer were not developed and the projected plan for establishing a colony of Finns in that region was abandoned after the death of the leading promoter. The starting of the Alaska Central Railway at the base of the peninsula gave an impetus to the development of the region tributary to Seward, and when completed it will tend to diminish traffic on Cook Inlet, since the mining camps at Hope, Sunrise, and other places on Turnagain Arm can be served more readily by the railway than by boat around the peninsula.

The work of the station was continued long enough to prove: First, that grain can not be successfully matured in that region—at least not until varieties are developed which can prosper in the comparatively cool summers. Second, that the hardy vegetables—kale, cabbage, turnips, potatoes, etc.—can be grown there very successfully; also that the berry fruits, raspberries, currants, and gooseberries, can be grown there. Third, it was proved that cattle can be reared in that location, and that butter and cheese of good quality can be made from the milk of cattle kept there. A small herd was maintained exclusively on native pasture and on feed produced on the station for several years. The cattle had to be fed for seven months in the year; but if hay is provided, this long feeding period is no obstacle to successful dairying. Fourth, it was proved that hay can be made not only from the native grass, which is abundant wherever the spruce forest

does not usurp the surface of the land, but that grain hay can be made in abundance with certainty and success every year. For this purpose oats were seeded in the early spring and cut for hay when in the milk stage. Should the district develop industrially, experiments can be resumed at any time.

HOT SPRINGS FARM.

Reference has been made in several of these reports to the famous Hot Springs Farm in the Tanana Valley. It is necessary to refer to it again, in order to report a fact which deserves notice. The farm was visited for the second time the past summer, the first visit having been made in 1905. At that time the development of the place had only fairly begun; now some 150 acres have been cleared and are cropped regularly. The larger portion of this area is devoted to the growing of potatoes, but there were during the past season upward of 20 acres in wheat, and a number of acres were devoted to oat hay. All the "warm ground" is, however, devoted to the growing of vegetables, most of which are sold in the market at Fairbanks and at other mining camps. The fact which it is desired to report may appear somewhat unusual. It is that watermelons were brought to maturity out of doors at this place. That it should be possible to bring watermelons to maturity with outdoor culture in latitude 64° N. in the Territory of Alaska is so extraordinary that the fact should be noted. The conditions are, of course, abnormal. It was possible to grow these melons because the soil surrounding the hot springs is warmed sufficiently by the same source of heat which heats the water, so that tender vegetables can be grown in the open. Muskmelons, squash, tomatoes, and sweet corn all did well on this warm soil. Two illustrations of this farm are presented herewith, one of the growing melons and squash referred to (Pl. IV, fig. 1) and the other (Pl. IV, fig. 2) of a patch of small corn which had ears large enough to use by August 18. Field corn, which seldom attains a height of more than 2 feet, if, indeed, it grows at all, here stood over 7 feet high, and would have afforded most excellent material for the silo.

NOTES ON NURSERY STOCK AND VEGETABLES AT THE SITKA STATION.

By R. W. De Armond.

The investigations with nursery stock and vegetables at the Sitka Station have been continued along the lines described in previous reports. An earnest effort is being made to secure for Alaska a greater number of varieties of fruit. The station has distributed for trial in different parts of the Territory a large number of young fruit trees and bushes; and, in addition, it now has under observation in

the nurseries at Sitka several thousand apple, plum, and cherry trees, raspberries, strawberries, etc. In order to determine their adaptability to Alaskan conditions, notes are taken of the condition of each variety at the beginning of the season, the amount and nature of growth at regular intervals during the summer, and the condition of the new growth at the end of the season. Detailed data showing these factors are given below.

APPLES.

During the winter of 1907-8 the larger trees were not so badly injured from effects of the frost heaving the ground as during the previous winter, but smaller bushes and plants suffered badly.

The season was more backward and cold than usual, causing a late start and slow growth. The leaf fungus was not so universal nor so persistent as last season, partly due perhaps to the continuous fight last year by spraying with Bordeaux mixture, early sprayings this season, and the coolness of the weather. The trees were sprayed five times, the first application being given before the buds began to open in the spring. New growth was pinched back in August and the leaves stripped off in October, as last season. As a preventive of root injury by frost heaving earth was banked about the trees.

Whitney (syn. Whitney No. 20) (crab): June 1, 22 trees, leafing out, not injured by cold, thrifty. July 15, 4 inches growth. August 15, 1 foot growth. October 15, 15 inches growth. Most thrifty variety. New wood in fair condition.

Yellow Transparent: June 1, 21 trees, slow in leafing, otherwise thrifty. July 15, 2 inches growth. August 15, 6 inches growth. October 15, 1 foot growth, wood softer than Whitney.

Peerless: June 1, 7 trees, very backward. July 15, 4 inches growth, thrifty. August 15, 12 inches growth. October 15, 15 inches growth, in good condition.

Martha (crab): June 1, 7 trees, leafing out, seem unthrifty. July 15, 2 inches growth. August 15, 4 inches growth. October 15, 10 inches growth, wood rather soft.

Lowell: June 1, 4 trees, poor condition. July 15, leaves good color, no growth. August 15, 2 inches growth. October 15, 3 trees made 6 inches growth, other tree very backward. New wood very tender.

Red Astrachan: June 1, 10 trees, very backward, 2 dead. July 15, no growth, otherwise seem thrifty. August 15, many of the leaves dead, apparently due to spray burn. October 15, new growth short and very soft.

Tetofski: June 1, 9 trees, leafing out slowly. July 15, 1 inch growth. August 15, 2 inches growth. October 15, 3 inches growth, wood soft.

Eureka: June 1, 14 trees, buds opening, unthrifty. July 15, 3 inches growth. August 15, 6 inches growth. October 15, 1 foot growth. New wood fairly well matured.

Sylvan Sweet (crab): June 1, 16 trees, leafing slowly. July 15, 2 inches growth, thrifty. August 15, 1 foot growth. October 15, 15 inches growth. New wood in fair condition.

Brier Sweet (crab): June 1, 2 trees, very bad condition. July 15, 3 inches growth. August 15, 1 foot growth. October 15, 18 inches growth. New wood rather soft.

Pyrus baccata: June 1, 13 trees, in leaf, thrifty. July 15, 6 inches growth, 1 tree in bloom. August 15, 1 foot growth, no fruit set. October 15, 18 inches growth, leaves dropping, wood in good condition.

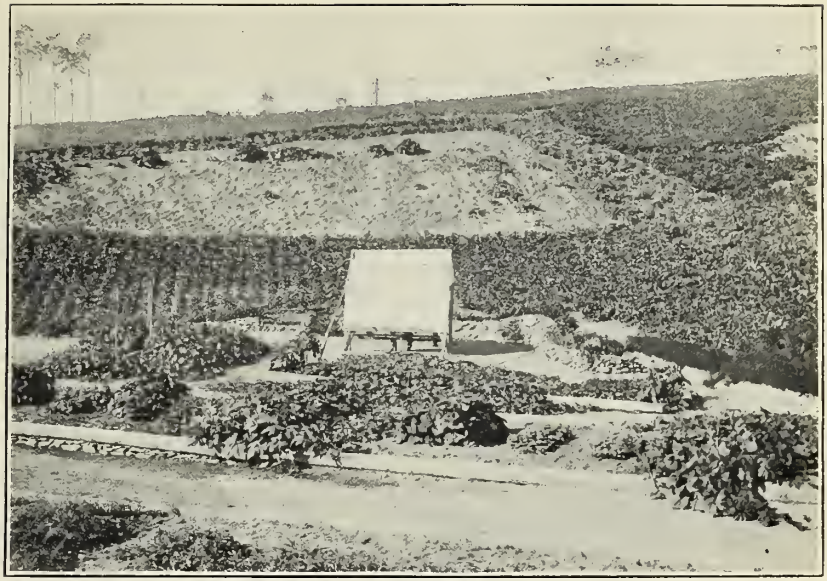


FIG. 1.—VIEW OF WATERMELONS AND MUSKMELONS IN OPEN, HOT SPRINGS FARM.

FIG. 2.—SWEET CORN, HOT SPRINGS FARM.

Transcendent (crab): June 1, 2 trees, in leaf, thrifty. July 15, 4 inches growth. August 15, 1 foot growth. October 15, 18 inches growth, wood fairly well hardened.

Hibernal: June 1, 14 trees, slow in leafing. July 15, making some growth. August 15, 6 inches growth, thrifty. October 15, 15 inches growth, new wood in fair condition.

Hyslop (crab): June 1, 6 trees, full leaf, thrifty. July 1, 1 tree (dwarf) in bloom. July 15, no fruit set, 6 inches growth. August 15, 8 inches growth. October 15, 1 foot growth, new wood in fair condition.

Raspberry: June 1, 18 trees, slow in leafing. July 15, 4 inches growth, thrifty. August 15, 1 foot growth. October 15, 15 inches growth, new wood in fair condition.

Red June: June 1, 15 trees, fair condition, slow in leafing. July 15, 3 inches growth. August 15, 6 trees not doing well, others thrifty with 1 foot growth. October 15, 15 inches growth, wood in fair condition.

Iowa Beauty: June 1, 4 trees, in leaf, promises well. July 15, poor condition. August 15, no growth. October 15, very poor condition.

Maiden Blush: June 1, 2 trees, leafing out. July 15, 2 inches growth. August 15, 4 inches growth. October 15, no additional growth, new wood very soft.

Early Harvest: June 1, 13 trees, nearly full leaf. July 15, very short growth, appear thrifty. August 15, 2 inches growth. October 15, 4 inches growth, very soft.

Northwestern Greening: June 1, 2 trees, leafing slowly. July 15, making thrifty growth. August 15, 1 foot growth. October 15, 15 inches growth, fair condition.

Okabena: June 1, 2 trees, nearly full leaf. July 15, 3 inches growth. August 15, 6 inches growth. October 15, 1 foot growth, new wood in fair condition.

Yellow Siberian (crab): June 1, 8 trees, in full leaf, thrifty. July 15, no growth, unthrifty appearance. August 15, 1 tree doing fairly well, others making no growth. October 15, thrifty tree made a growth of 1 foot, others made but little growth.

Green Sweet: June 1, 1 tree, rather backward. July 15, strong, thrifty growth. August 15, growth short. October 15, new growth 3 inches, very soft.

Patten: June 1, 11 trees, leafing out. July 15, 4 inches growth. August 15, 1 foot growth. October 15, 15 inches growth, fair condition.

Jessie: June 1, 7 trees, full leaf, thrifty. July 15, 2 inches growth. August 15, 1 foot growth. October 15, 15 inches growth, rather soft.

Princess Louise: June 1, 1 tree, poor condition. July 15, no growth. August 15, bad condition. October 15, in dying condition.

Duchess: June 1, 10 trees, very poor condition. July 15, 3 inches growth, looking fair. August 15, 6 inches growth. October 15, 1 foot growth, good condition.

Walbridge: June 1, 1 tree, leafing, tips badly winterkilled. July 15, making some growth. August 15, 6 inches growth. October 15, 12 inches growth, wood very soft.

North Star: June 1, 2 trees, rather backward. July 15, thrifty, 4 inches growth. August 15, 1 foot growth. October 15, 15 inches growth, wood in good condition.

Orange (crab): June 1, 9 trees, in leaf, thrifty. July 1, no growth. August 15, very poor condition. October 15, dying.

Jeannette Winter: June 1, 4 trees, very backward. July 15, appear thrifty, growth short. August 15, 4 inches growth. October 15, 8 inches growth, fair condition.

Dartt: June 1, 10 trees, in leaf, thrifty. July 15, 3 inches growth. August 15, 6 inches growth. October 15, 10 inches growth, wood in good condition.

Greenwood Crab: June 1, 4 trees, in leaf, thrifty. July 15, 4 inches growth. August 15, 12 inches growth. October 15, 18 inches growth, wood in good condition.

Native crab (*Pyrus rivularis*): June 1, 25 trees, full leaf, thrifty condition, bloom buds nearly open. July 15, 8 inches growth. One tree well set with fruit. August 15, leaves dropping, new growth thrifty. October 15, leaves dropped naturally, new wood well seasoned.

APPLE TREES ON NATIVE CRAB STOCK.

Lowell: June 1, 4 trees, leafing out, tips winterkilled. June 16, making thrifty growth. August 15, 6 inches growth. October 15, 12 inches new growth, wood rather soft.

Red June: June 1, 1 tree, rather backward, tips winterkilled. July 16, making some growth. August 15, poor condition. October 15, almost dead.

Okabena: June 1, very slow starting. July 15, making some growth. August 15, rather backward. October 15, new growth, short and tender.

Duchess: June 1, nearly full leaf. July 15, very thrifty appearance, growth short. August 15, 2 inches growth. October 15, leaves dropped naturally; new wood short, well seasoned.

STANDARD APPLE TREES IN BREWERY LOT.

Raspberry: June 1, 400 trees, full leaf, thrifty. July 20, 6 inches growth, some injury by leaf fungus. August 15, good condition, 1 foot growth. October 15, 15 inches growth, new wood in fair condition.

Benoni: June 1, 5 trees, rather backward, leaves not nearly developed. July 20, 6 inches growth, thrifty, some fungus. August 15, 12 inches. October 15, very little additional growth, wood in fair condition.

Williams Favorite: June 1, 3 trees, very poor condition. July 20, not doing well. August 15, poor condition. October 15, nearly dead.

Primate: June 1, 5 trees, leafing out, unthrifty. July 20, no growth. August 15, not doing well. October 15, very bad condition.

Fanny: June 1, 5 trees, unthrifty. July 20, 2 inches growth, unthrifty. August 15, nearly dead. October 15, no improvement.

Golden Sweet: June 1, 5 trees, nearly full leaf, look well. July 20, 5 inches growth. August 15, 8 inches growth. October 15, 10 inches growth, new wood rather tender.

Sops of Wine: June 1, 5 trees, all dead.

Summer Rose: June 1, 2 trees dead, other 3 in bad condition. July 20, making no growth. August 15, very poor. October 15, nearly dead.

Sweet Bough: June 1, 5 trees leafing nicely, good color. July 20, 5 inches growth. August 15, 8 inches growth. October 15, 12 inches growth, wood rather soft.

Early Strawberry: June 1, 1 alive, very poor condition. July 20, making no progress. August 15, nearly dead.

Orange (crab): June 1, 95 trees, well leafed. July 20, considerable leaf fungus, making no growth. August 15, bad condition. October 15, some growth, trees unthrifty.

Whitney No. 20: June 1, 5 trees, poor condition. July 20, no growth. August 15, very poor. October 15, very little growth.

Pyrus baccata: June 1, full leaf, thrifty. July 20, 3 inches growth. Augnst 15, 6 inches growth. October 15, 12 inches growth, wood in good condition.

DWARF TREES.

Sweet Bough: June 1, 3 trees, leafing out, good color. July 20, 3 inches growth. August 15, 6 inches growth. October 15, 8 inches growth, new wood in fair condition.

Tetofski: June 1, 3 trees, very backward. July 20, 3 inches growth. Angnst 15, 4 inches growth, not thrifty. October 15, 6 inches growth, wood well seasoned.

Golden Sweet: June 1, 3 trees, most advanced of any variety. July 20, 7 inches growth. August 15, 12 inches growth. October 15, 15 inches growth, new wood in fair condition.

Primate: June 1, 2 trees, nearly dead. July 20, unthrifty growth. Augnst 15, nearly dead.

Early Harvest: June 1, 3 trees, rather backward, good color. July 20, 3 inches growth. August 15, 6 inches growth. October 15, little additional growth, new wood in good condition.

Fanny: June 1, 3 trees, poor condition. July 20, no improvement. Augnst 15, nearly dead.

Keswick Codlin: June 1, 3 trees, leaves well advanced. July 20, 3 inches growth, leaves poor color. August 15, 4 inches growth. October 15, 6 inches growth, new wood in good condition.

Yellow Transparent: June 1, 3 trees, rather backward. July 20, making no growth. August 15, 4 inches growth. October 15, 6 inches growth, wood in good condition.

Red Astrachan: June 1, 3 trees, nearly dead. July 20, making no progress. August 15, dead.

CHERRIES.

The cherry trees were uninjured by frost during the winter of the past season. They bloomed freely, but the continuous rainfall prevented the fertilization of the flowers. Most of the fruit set cracked open before becoming fully ripe. The English Morello gives the most promise, though Early Richmond is a close second.

English Morello: June 1, leafing out, most advanced variety of the cherries. July 15, 6 inches growth, full bloom, very little fruit set. August 15, fruit ripening, 1 foot growth. October 15, 18 inches growth, leaves beginning to color.

Early Richmond: June 1, rather backward. July 15, new growth very short, well loaded with bloom, fruit not setting well. August 15, 15 inches growth, fruit ripening, very good flavor, skin tender and cracks badly. October 15, 18 inches growth, leaves falling.

Ostheim: June 1, very backward. July 15, 6 inches growth, not so heavily loaded with bloom as other varieties, very little fruit setting. Angust 15, 15 inches growth, fruit dropped. October 15, 2 feet growth, some leaves coloring.

Dyehonse: June 1, most backward of the cherries. July 15, very thrifty, few blooms, some fruit. Angust 15, 15 inches growth, fruit ripe, poor flavor, cracked open. October 15, 2 feet growth.

Juneberry: June 1, in leaf, thrifty, bloom buds opening. July 15, yet blooming, fruit setting well. August 15, continues to bloom, berries small, few ripening. October 15, fruit ripe, small, tasteless, 10 inches new growth.

PLUMS.

The May Day is the only variety of plum that was uninjured by frost; in fact, the only variety that gives any promise. All the others were badly killed back by freezing.

May Day: June 1, 3 trees, full leaf, 4 inches growth, few bloom buds. July 15, 18 inches growth, no fruit. August 15, 24 inches growth. October 15, 30 inches growth. All leaves fallen, wood in fine condition.

Sayles: June 1, 2 trees, nearly dead. July 15, 1 tree died, other making thrifty growth. August 15, 12 inches growth. October 15, 18 inches growth, wood very soft.

Hawkeye: June 1, very backward, badly winterkilled. July 15, making thrifty growth. August 15, 12 inches growth. October 15, 18 inches growth, wood very soft.

Wyant: June 1, slow in starting growth. July 1, growth 4 inches, spindling. August 15, 12 inches growth. October 15, 18 inches growth, new wood in fair condition.

Odegard: June 1, leafing out, slightly winterkilled. July 15, 8 inches growth, rather spindling. August 15, 12 inches growth, looks well. October 15, 15 inches growth, new wood in fair condition.

Desoto: June 1, leafing out, tips winterkilled. July 15, thrifty, 4 inches growth. August 15, 15 inches growth. October 15, 18 inches growth, very soft.

Rollingstone: June 1, badly winterkilled, leafing out. July 15, making good growth. August 15, 15 inches growth. October 15, 18 inches growth, wood rather soft.

Scout: June 1, leafing out slowly. July 15, growth short, few blooms, no fruit. August 15, 6 inches growth. October 15, 10 inches growth, wood very soft.

Aitkin: June 1, badly winterkilled, starting growth. July 15, making thrifty growth. August 15, 12 inches growth. October 15, 15 inches growth, very tender.

Prunus besseyi: June 1, 37 trees, in leaf, unthrifty. July 15, few plants making good growth. August 15, 12 inches growth. October 15, some trees 15 inches growth, leaves falling.

Americana Mixed: June 1, badly winterkilled, backward in starting. July 15, making thrifty growth. August 15, 15 inches growth. October 15, 24 inches growth, very tender.

Seedling of Wyant: June 1, badly winterkilled, slow in starting growth. July 15, making thrifty growth. August 15, 15 inches growth. October 15, 24 inches growth, wood very tender.

Seedling of Cherry Plum: These trees make a growth and in all respects behave about the same as Seedlings of Wyant.

CURRANTS.

All varieties of currants leafed early and made a good growth. Every bush was full of bloom and fruit set plentifully. A good crop was gathered from all but a few of the black varieties, which suffered from a mildew which destroyed the fruit. Spraying with Bordeaux mixture did not seem to check this fungus.

The black varieties are not entirely hardy in this climate and are difficult to propagate by cuttings, but layer readily. Lee Prolific gives the best results of the varieties growing at this station.

Lee Prolific: June 1, 2 inches growth, not yet in bloom. July 15, fruit clusters small, bushes thrifty. August 15, fruit ripe, well flavored. October 15, 3 feet growth, leaves falling, wood in fair condition.

Russian Black: June 1, new growth short, in bloom. July 15, 15 inches growth, very little fruit set. August 15, 2 feet growth, fruit ripening. October 15, 3 feet growth, leaves falling, wood in good condition.

Champion: June 1, new growth short, full bloom. July 15, fruit partially destroyed by mildew, bushes thrifty. August 15, fruit ripening, 18 inches growth. October 15, 3 feet growth, good condition.

Common Black: June 1, 2 inches growth, some bloom. July 15, bushes thrifty, fruit destroyed by mildew. August 15, 3 feet growth. October 15, 3½ feet growth, in good condition.

Native Black (Sunrise): June 1, 2 inches growth, in bloom. July 15, making thrifty growth, fruit destroyed by mildew. October 15, 18 inches growth, leaves fallen, good condition.

Native Black (Kenai): June 1, full leaf, growing nicely. August 15, making good thrifty growth. October 15, 8 inches growth, leaves fallen, wood well matured.

Native Black (Sitka): June 1, 4 inches growth, in bloom. July 15, making strong growth, fruit all dropped. August 15, 15 inches growth. October 15, 2 feet growth, leaves fallen, wood in excellent condition.

Manitoba Amber: July 1, 3 inches growth, full bloom. August 1, bushes thrifty, fruit destroyed by mildew. August 15, 2 feet growth. October 15, 3 feet growth, leaves falling.

Both the red and white varieties yielded good crops. The Red Cross is superior in every way for this climate, standing first among the varieties grown at this station.

Red Cross: June 1, 2 inches growth, full bloom. July 15, bushes heavily loaded, berries large, 12 inches growth. August 15, fruit ripe, good condition, 18 inches growth. October 15, 2 feet growth, leaves falling (Pl. V, fig. 1).

Wilder: June 1, 3 inches growth, in bloom. July 15, 15 inches growth, bushes well loaded with fruit, clusters small, berries large. August 15, 2 feet growth, fruit ripening. October 15, 2½ feet growth, leaves falling, good condition.

Ruby Castle: June 1, 3 inches growth, full bloom. July 15, 15 inches growth, fruit clusters and fruit small. August 15, fruit small, well flavored, 2 feet growth. October 15, 30 inches growth, good condition.

Victoria: June 1, 2 inches growth, full bloom. July 15, well loaded with fruit, 15 inches growth. August 15, fruit ripe, berries small, quite acid, 2 feet growth. October 15, new canes 3 feet long, good condition.

Fay: June 1, 3 inches growth, in bloom. July 15, 15 inches growth, fruit well set. August 15, fruit ripe, in good condition. October 15, 2 feet growth, leaves dropping, good condition.

Native Red (Kenai): June 1, 3 inches growth, in bloom. July 15, good thrifty growth, no fruit. October 15, 15 inches growth, leaves fallen, wood well hardened.

White Currants: June 1, 2 inches growth, in bloom. July 15, thrifty, loaded with fruit, 15 inches growth. October 15, 18 inches growth, good condition.

GOOSEBERRIES.

All varieties of gooseberries with the exception of the native varieties yielded a splendid crop of fruit. Last fall the bushes were mounded up, in order to get the branches to strike root, it being difficult to propagate them from cuttings. The mounding has been fairly successful. Propagation by seed seems to be practicable, and the station now has seedlings growing from the best varieties.

Smith Improved: June 1, short growth, full bloom. July 15, 15 inches growth, well fruited. August 15, 2½ feet growth, fruit ripening. October 15, 3 feet growth, good condition.

Champion: June 1, in bloom, new growth short. July 15, 15 inches growth, fruit well set. August 15, 2 feet growth, fruit ripening. October 15, little additional growth, leaves fallen, wood well seasoned.

Red Jacket: June 1, 1 inch new growth, full bloom. July 15, not so heavily fruited as other varieties, thrifty growth. August 15, fruit ripening, 15 inches growth. October 15, 2 feet new growth, good condition.

Native Black (Skagway): June 1, 2 inches growth, blooming. July 15, making thrifty growth, fruit mildewed. August 15, leaves injured by spray, making strong growth. October 15, 15 inches growth, leaves falling, good condition.

Native Black (Kenai): June 1, making thrifty growth. October 15, 10 inches growth, leaves fallen, wood well matured.

Of the English varieties none excel the Whitesmith in growth of wood and production of fruit (Pl. V, fig. 2).

Whitesmith: June 1, full leaf, no growth, in bloom. July 15, 15 inches growth, fruit well set. September 15, fruit ripe. October 15, 2½ feet growth, rather soft.

Triumph: June 1, no growth, full bloom. July 15, 15 inches growth, well fruited. September 15, fruit ripe. October 15, 2 feet growth, leaves falling, wood in good condition.

Columbus: June 1, thrifty, full bloom. July 15, 15 inches growth, not so heavily fruited as other varieties. September 18, fruit picked. October 15, 2½ feet growth, very good.

Industry: June 1, 3 inches growth, full bloom. July 15, 15 inches growth, moderately well fruited. September 18, fruit picked. October 15, 2 feet growth, leaves falling, wood well seasoned.

RASPBERRIES.

The Cuthbert is the only raspberry of the varieties grown here that has proven itself worthy of cultivation in this climate. The other varieties produced berries, but they are small and ill-flavored.

Cuthbert: June 1, full leaf, bloom buds well advanced. July 15, fruit well set, promising a bountiful yield. August 16, fruit ripening. October 15, 7 feet new canes, leaves falling, good condition.

London: June 1, thrifty appearance, blooming. July 15, growth slow, fruit poorly set. August 15, fruit very poor. October 15, 4-foot canes, wood rather soft.

Snyder, Millers Favorite, Fullers, and Turner acted about the same as did London. The same description answers for all.

STRAWBERRIES.

The strawberries suffered greatly from frost heaving the ground. This freezing and thawing continues until late spring, requiring frequent resetting of the plants. In spite of this there was a fair crop of berries.

Hollis: June 1, making thrifty start, beginning to bloom. July 15, fruit ripening, many berries ill-formed. August 15, fruiting time nearly ended. October 15, plants in good condition.

Magoon: June 1, not recovering from winter injury as readily as the Hollis. August 15, doing nicely. October 15, in good condition.

Yakutat (native wild): June 1, very thrifty, blooming. July 15, fruit ripening, yet blooming. August 25, last berries picked. October 15, very thrifty.

FIG. 1.—RED CROSS CURRANT.

FIG. 2.—WHITESMITH GOOSEBERRY.

Euhance: June 1, transplanted May 24. August 15, doing very well. October 15, very few new plants.

Bismark: June 1, plants not making a rapid recovery from winter injury. August 15, growiug nicely. October 15, very thrifty.

Oom Paul and Native New Jersey: Transplanted June 1. August 15, plants look thrifty. October 15, no new plants.

Native plants from interior. Transplanted May 27. August 15, making thrifty growth, plants setting freely. October 15, leaves dying; new plants small.

HYBRID STRAWBERRY PLANTS.

Enhance × Yakutat: Plants set in open grouud May 27. August 15, doing well. October 15, good condition.

Magoon × Yakutat: Set to open ground May 27. August 15, thrifty. October 15, good condition.

Hollis × Yakutat: A number of these plants bloomed and some fruited, all made a vigorous growth. In this way they resemble the Yakutat parent and like them, will perhaps have to be grown on poorer soil to fruit abundantly.

No. 1: June 8, showing bloom, strong plant. July 15, no fruit.

No. 2: June 8, showing bloom, perfect flower, tips of petals pink. July 15, no fruit formed.

No. 3: June 8, showing bloom buds, plant weak. July 15, fruit small, ill-formed, seeds black.

No. 4: June 8, showing bloom buds, plant very weak. Berries size of peas, one ripe, seeds black, no regular form.

No. 5: June 8, showing bloom buds, plant very weak. July 15, three berries, medium size, dark seeds, Yakutat form. Runners bright red.

No. 6: June 8, showing bloom buds, plant medium. July 15, one cluster of fine berries. Plant and fruit resemble the pure Yakutat.

No. 7: June 8, showing bloom, full large, staminate, plant weak. July 15, no fruit set.

No. 8: June 8, showing bloom buds, plant weak. July 15, three very small berries.

No. 9: June 8, showing flower, pistillate, plant weak. July 15, 3 clusters well formed. August 10, fruit large, roundish, dark seeds, ripened fruit color up like Hollis parent. Plant resembles the Yakutat.

No. 10: June 8, showing bloom buds, plant medium. July 15, fruit withered.

No. 11: June 8, showing flower, perfect, plant medium. July 15, 3 berries smaller thau average Yakutat. August 10, seeds black, ripened fruit color of Yakutat.

No. 12: June 8, showing flower, perfect, petal tips pink. Plant medium. July 15, 5 small berries formed, withered up without ripening.

No. 13: June 8, showing flower, plant weak. July 15, 1 medium berry. August 15, Yakutat form and color, seeds more green. Runners red.

No. 14: June 8, showing flowers, pistillate, plants medium. July 15, no fruit formed.

No. 15: June 8, showing flowers, staminate, plant medium. July 15, no fruit formed.

No. 16: June 8, showing flowers, staminate, plants medium. July 15, fruit dried up without ripening.

No. 17: June 8, showing bloom buds, plants medium. July 15, berries about size of peas. August 10, dried up.

No. 18: June 8, showing flowers, plants very weak. July 15, fruit very small. August 10, withered up without ripening.

No. 19: June 18, showing flower, pistillate, plant moderate. July 15, no fruit.

No. 20: June 18, showing flower, perfect, plant vigorous. July 15, no fruit.

No. 21: June 18, showing flower, pistillate, plant very weak. July 15, berries size of peas, plant small. August 10, did not ripen.

No. 22: June 18, showing flower buds, plant moderate. July 15, 2 berries, ill-formed, above average size. August 10, ripened, brighter red than Yakutat, seeds dark.

No. 23: June 18, showing flowers, plant vigorous. July 15, 2 well-formed berries. August 10, medium size, form and color of Hollis, seeds dark.

No. 24: June 18, in bloom, plant vigorous. July 15, no fruit.

No. 25: June 18, showing bloom buds, plant vigorous. July 25, 2 clusters, berries small, ill-formed. August 10, ripened and rotted.

No. 26: June 18, in bloom, plant weak. July 15, 1 berry ill-formed, plant small and weak.

No. 27: June 18, in flower, plant moderate. July 15, no fruit.

No. 28: June 18, in bloom, plant very vigorous. July 15, 2 berries, well-formed above average size. August 10, egg-shaped, dark seed, brighter color than Yakutat.

No. 29: June 18, in bloom, very vigorous. July 15, 1 berry smaller than medium Yakutat. August 10, rotted.

No. 30: June 18, in bloom, plant vigorous. July 15, 2 berries well formed. August 10, smaller than average Yakutat, which they resemble.

No. 31: June 18, in flower, vigorous. July 15, no fruit.

No. 32: June 23, in bloom, plant vigorous. July 15, 2 berries formed. August 10, medium size, resemble Yakutat parent.

No. 33: July 3, bloom and fruit, medium. July 15, fruit rotted, plant unthrifty.

POTATOES IN BREWERY LOT.

The soil in this lot was given a dressing of seaweed during the winter, which was plowed under in April and the ground planted to potatoes on April 18. The yield of a 200-foot row of each of the following varieties is given:

Comparative yields of potatoes.

Variety.	Marketable.	Unmarketable.	Variety.	Marketable.	Unmarketable.
	Pounds.	*Pounds.*		*Pounds.*	*Pounds.*
Garfield	115	15	Norway No. 2	95	25
White Mammoth	10	.....	Norway No. 3	125	20
Lincoln	75	.....	Banner	55	12
Russian Stock	90	.....	Early Harvest	50	13
Hamilton Early	130	30	Bovee	34	15
Extra Early	145	12	Early Michigan	100	15
Extra Early Triumph	90	15	Early Ohio	45	20
White Beauty	79	15	Extra Early Ohio	70	20
Carman No. 3	70	15	Vigorosa	45	15
Gold Coin	160	20			
Vornehm	55	15	Total	1,721	304
Norway No. 1	83	12			

Potatoes were planted on the station farm in soil receiving but a light dressing of fish guano.

They were planted during the third week of May and given thorough cultivation until the last of August, when they were hilled. The length of each row was 130 feet. The yield of potatoes was as follows:

Comparative yields of potatoes.

Variety.	Marketable.	Unmarketable.	Variety.	Marketable.	Unmarketable.
	Pounds.	*Pounds.*		*Pounds.*	*Pounds.*
Early Michigan (3 rows)	175	100	Vornehm (1 row)	25	42
Extra Early (1 row)	45	50	Early Ohio (1 row)	15	18
Extra Early Ohio (3 rows)	245	70	Lincoln (1 row)	17	20
Extra Early Triumph (1 row)	30	64	Early Harvest (1 row)	10	10
Vigorosa	13	8	Burpee Early (1 row)	11	12
Hamilton Early (1 row)	11	25	Garfield (1 row)	120	75
Banner (1 row)	26	27	Gold Coin (1 row)	110	22
Freeman (6 rows)	280	280			
Bovee (1 row)	40	40	Total	1,173	863

CABBAGE.

Early Jersey Wakefield only was planted this season. The plants were set in the open during May. Root maggot and club root were very bad, doing much damage. In spite of these pests and disease, 70 per cent of the plants made marketable heads, weighing from 4 to 8 pounds.

CAULIFLOWER.

Two varieties of cauliflower—Early Paris and Veitch Autumn Giant—were planted. The two varieties were planted at the same time and came into head at the same time. The latter variety averaged the larger heads. Like the cabbage, the cauliflower suffered from the root maggot and club root. Forty per cent of the plants produced marketable heads.

KALE.

Scotch kale and the Thousand Headed kale were planted, but the seed of the Scotch failed to germinate. The plants of the other variety were set in open ground in May. These made a very thrifty growth. Seed was planted in the open at the same time and plants from this planting made a growth equal to that started under glass.

TURNIPS.

Two varieties of turnips, Purple Top Strap Leaf and Petrowski Turnip, No. 19554, were sown.

The Petrowski is a slow-growing, round, smooth, yellow turnip, with a thick skin, solid, crisp, and of very good quality. The root maggot works on it less than on any other variety grown at this station. This may be partly due to the thick skin and partly to the habit the leaves have of growing flattened close to the ground.

Plantings of the two varieties were made on four dates, May 12, June 3, July 2, and August 5. The Purple Top Strap Leaf variety was destroyed by the maggots in all except the last planting, which was only partially affected. The second planting of the Petrowski was attacked in places and badly affected with the club root. The last planting was too late to make marketable roots. It seems that the Petrowski is the most reliable variety to plant, though it is about two weeks slower in reaching marketable size than the Purple Top.

Four plantings of ruta-bagas were made on the same dates as above. The first planting did very well; the later plantings were poor and worthless.

ORNAMENTALS.

Rosa rugosa: June 1, 2 inches growth. Seedlings doing nicely. Layers slow in striking root. August 15, very thrifty, blooming freely. Seedlings growing nicely. October 15, last bloom, seed ripe and being stratified. Many new plants from underground runners.

Niobe willow: June 1, backward in starting. Cuttings well advanced. October 15, 4 feet growth, leaves green, wood very tender.

Mountain ash: June 1, thrifty start. October 15, 2 feet growth, leaves falling.

Siberian sand thorn: June 1, very backward. August 15, making some growth. October 15, very little growth, leaves falling.

Tartarian honeysuckle: June 1, 5 inches growth, nearly in bloom. August 15, very few berries, 2 feet growth. Cuttings doing well. October 15, leaves gone, wood in good condition.

Siberian pea tree (*Caragana arborescens*): June 1, very backward. August 15, looks well, making growth. October 15, 6 inches growth, leaves falling.

Eglantine: June 1, partly killed by frost, leafing out. August 15, very thrifty. October 15, 14 inches growth, wood tender.

Ural willow: June 1, in leaf, nearly in bloom, cuttings start slowly. October 15, very thrifty growth, good condition, 4 feet growth.

Lilac: June 1, making thrifty start. August 15, making a very thrifty growth. October 15, 15 inches growth, in fair condition.

REPORT ON WORK AT THE RAMPART STATION.

By J. W. Gasser, *Superintendent.*

CLIMATIC CONDITIONS.

The growing season of 1907 was terminated by a killing frost, September 6. Light freezing weather continued, and September 20 the first snow fell. Because of the abundance of winter moisture and the fact that the ground was well covered with snow before severely cold weather came, the outlook was promising for winter grains and grasses.

The winter as a whole was considered mild, with rather more than the average amount of snow. The coldest wave swept the country from the northeast during the month of January, reaching its greatest intensity on January 21, when the thermometer registered —61° F.

Ice began running in the Yukon River October 8 and continued till November 2, when the ice jammed and closed the river until the following May.

Though spring came a little earlier than usual, the heavy snowfall (50 inches) had not all melted by May 1. The ice broke in the river May 14, and light freezing weather continued until May 20.

Because of the very light rainfall, the summer was unusual, quite the driest on record. Had it not been for the moisture rising to the surface from the constantly thawing ground, all crops would have suffered severely. It is surprising that less than 3 inches of rain during the three growing months of June, July, and August would

suffice to produce a perfectly mature crop. Yet all grains did uncommonly well. But potatoes and garden truck in general suffered considerably.

In many places mining operations were entirely suspended for lack of water.

The heaviest rainfall of the season during twenty-four hours occurred June 15 during a thunder shower, accompanied with some hail. Precipitation, 0.55 inch. It is apparent, therefore, that the summer's rain came in such small quantities as to be of very little benefit to growing crops, especially to those in cultivated ground, where the surface had dried down a couple of inches.

The first killing frost of 1908 came September 9, when the temperature fell to 27° F. The month continued dry, with no snow and very little freezing weather. Winter grains have made a very light growth and the outlook for them is not promising.

WORK OF THE SEASON.

Aside from the care of the crops, which occupied nearly all of the superintendent's time and a part of the time of another man, efforts were directed chiefly toward clearing land. A large tract was burned over during the middle of the summer, and because of the very dry weather the fire did uncommonly good execution. In many places the moss and underlying tree roots were burned off so completely that the stump puller was unnecessary in the subsequent work of ridding the land of stumps. By piling what wood remained on the ground around the larger and solider stumps still standing, these, too, were burned out completely, or at least sufficiently so to permit of being removed very quickly. Proceeding in this manner, the clearing was extended quite rapidly, especially during the latter part of the season. During the first part of the season the horse stump puller (Pl. III, fig. 1, p. 16) was used to advantage, as at that time work was being done on ground that had been burned over the preceding year, when the conditions for effective burning were not as favorable as this year. Also, in a swale of something over an acre in extent, the stumps had to be pulled and the moss stripped off with mattocks. Because of the heavy covering of moss (from 4 to 6 inches) this swale remained wet throughout the summer, pools of water collecting even where stumps had stood.

Eight acres of land were cleared this season, just doubling the area under cultivation for next year. The newly cleared land is quite similar, both in location and composition, to that already under cultivation, being adjacent to the low wet land bordering the river. Both new and old land have been plowed preparatory for next year's crop.

Three men were employed throughout most of the summer season. Two of the three spent practically all the time clearing land. The third man helped with the crops when needed, otherwise also worked in the clearing.

GRAIN CROPS.

All ground intended for crops having been plowed in the fall, spring seeding was begun May 15, at least a week earlier than if the ground had not been fall plowed. The soil was in good physical condition when seeded. All experi-

mental plats were seeded in drills with a planet junior seeder. Larger areas were broadcasted and harrowed in.

For grain growing the past season was an exceptionally favorable one. Of the 67 varieties of grain grown 56 fully ripened. Of the 11 that did not ripen only 2 (einkorn and Belyak oats) failed to produce viable seed. In spite of the dry weather the heads, as a general thing, were well filled and the straw of good length (Pl. II, fig. 1, p. 14). Harvest began at least a week earlier than in preceding years.

With a view of producing earlier maturing strains select heads of 50 varieties of wheat, oats, and barley were cut, labeled, and laid away for spring planting (Pl. II, fig. 2, p. 14). According to similar work done elsewhere it is believed that by carefully and judiciously selecting the earliest maturing and best-formed heads an earlier ripening strain will be produced in the course of a few years. A sharp lookout is being kept for promising mutations and volunteer grains. This year on one edge of the field several culms of volunteer wheat were observed bearing unusually large, well-filled heads. Several of these heads ripened thoroughly, the best containing 90 grains. A test will be made next year of this wheat, which appears to be of a velvet variety.

From the following notes it is to be understood that the bulk of the grain was cut in from eight to ten days later than the "select heads." This "bulk" will be thrashed, carefully cleaned with a fanning mill, and stored for seeding at this station and for distribution as needed. Grain that failed to ripen was cut after the first frost and will be used as hay.

WINTER GRAIN.

All the winter grain, except emmer, was seeded August 16, 1907, was up August 24, and made a good growth, covering the ground pretty well before snow fell. The wheat, rye, and emmer wintered perfectly. But the barley and oats were killed, with the exception of two of the barleys, where only a partial stand remained. In the spring every green blade was eaten off to the ground by the rabbits. For this reason, probably, the grain matured later than it should have done considering the season.

WHEAT.

Kharkof, S. P. I. No. 12001,[a] station seed; July 1, best 19 inches high, and heading, uneven growth; July 9, in bloom; September 9, ripe and cut. This plat grew longer straw and larger heads than an adjoining plat planted with Department seed.

Kharkof, S. P. I. No. 12001, Department seed: July 1, heading 18 inches high; July 9, in bloom; September 9, ripe and cut. Ripened very slowly.

RYE.

S. P. I. No. 11268: July 1, in bloom, 48 inches high; September 5, ripe and cut; heads small and not well filled.

Giant French: July 1, headed out, 48 inches high; July 8, in bloom; September 5, ripe and cut; some large heads, but few well filled.

Amber, station seed: July 1, 42 inches high; July 8, in bloom; September 5, ripe and cut.

Excelsior: July 7, in bloom, 60 inches high; September 5, ripe and cut. Heads well filled with large, plump grains.

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[a] Refers to importations by U. S. Department of Agriculture, Section of Seed and Plant Introduction.

BARLEY.

G. I. No. 521[a] and G. I. No. 522: Winterkilled entirely.

Invincible, No. 386: About one-quarter of a stand; rest winterkilled. July 1, headed, 26 inches high; July 6, in bloom; September 5, ripe and cut; fair-sized heads well filled.

Tennessee Winter, S. P. I. No. 15829: Seeded May 24, 1907; up June 4; winterkilled entirely, except on one edge of plat where the snow lay deepest; July 1, headed out, 28 inches high; August 10, ripe and cut; good-sized, well-filled heads.

OATS.

Snoma, S. P. I. No. 16864: Seeded August 16; up August 24; made best growth of any of the winter grains, but was frozen out completely.

EMMER.

No. 19385: Seeded August 6; up August 15; made a good fall growth and came up a perfect stand the following May; July 1, heading, 30 inches high; July 9, in bloom; September 9, cut though not fully ripe. This plat was exceptionally fine looking. The heads were large and well filled, and the straw of good length, and stood up well when other grain had been blown down.

SPRING GRAIN.

WHEAT.

Ghirka, G. I. No. 1517: Seeded May 18; up June 1; June 11, heading, 20 inches high; July 17, in bloom, some smut heads; September 9, harvested. Only fairly well ripened.

Arnautka: Seeded May 15; up June 1; July 14, heading, 24 inches high; July 22, in bloom; September 10, cut for hay. This variety has never ripened here, and further trials seem unnecessary.

Kubanka, G. I. No. 1440: Seeded May 18; up June 1; July 12, heading, 19 inches high; July 22, in bloom; September 10, cut for hay. Will be discontinued.

Einkorn, S. P. I. No. 10474: Seeded May 16; up June 2; July 22, heading, 17 inches high; September 10, grain in the milk, cut for hay. Will be discontinued.

From Eagle, Alaska: Seeded May 16; up June 4; stand and growth uneven; July 22, in bloom; September 10, not fully ripe; large, well-filled heads. A few of the best heads saved for seed.

From Tanana, Alaska: Seeded May 15; up June 1; July 1, still in the rosette stage; did not head; evidently a winter variety.

Romanov, station seed: Seeded May 20; up June 4; July 15, heading, 21 inches high; July 22, in bloom; September 1, ripening very slowly; September 9, ripest heads cut.

BARLEY.

Hannchen, S. P. I. No. 10585, station seed: Seeded May 15; up June 1; July 10, heading, 24 inches high; July 15, in bloom; August 19, select heads cut; lodged badly where growth was heaviest.

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[a] Refers to numbers adopted by U. S. Department of Agriculture, Grain Investigations.

From Eagle, Alaska: Seeded May 16; up June 1; July 17, heading, 24 inches high; irregular and not very thrifty growth; July 15, in bloom; August 25, select heads cut.

From Eagle, Alaska: Seeded May 23; up June 2; July 4, heading, 22 inches high; fine even growth; July 9, in bloom; August 14, ripe and cut. This is evidently the same variety as barley No. 18922, having identical growth characteristics.

From Eagle, Alaska, six-rowed: Seeded May 16; up June 2; July 8, heading, 24 inches high; July 16, in bloom; August 25, select heads cut.

Finnish, G. I. No. 581: Seeded May 18; up May 31; frosted slightly June 9 and 10; July 1, heading, 12 inches high; poor growth and poor color; July 8, in bloom; August 14, select heads cut; very short straw and small heads.

Scottish Pearl, G. I. No. 277: Seeded May 20; up June 7, heading, 19 inches high; uneven growth; July 17, in bloom; August 11, select heads cut; lodged a little.

Teldnaes, G. I. No. 561, from northern Norway: Seeded May 20; up June 1; July 1, heading, 20 inches high; August 10, select heads cut; lodged a little.

Stroemmen, G. I. No. 562, from Norway: Seeded May 20; up June 1; July 1, heading, 24 inches high; July 8, in bloom; August 10, select heads cut; lodged a little.

Moljord, G. I. No. 564, from Norway: Seeded May 20; up June 2; July 1, heading, 20 inches high; July 8, in bloom; August 10, select heads cut; lodged a little.

Yakutsk, G. I. No. 574, from Yakutsk: Seeded May 20; up June 2; July 3, heading, 20 inches high; July 10, in bloom; August 14, select heads cut.

Bodoe, G. I. No. 568, from Norway: Seeded May 20; up June 1; July 1, heading, 20 inches high; July 9, in bloom; August 10, select heads cut; lodged somewhat.

Svalof, G. I. No. 560, originally from Yakutsk, Siberia: Seeded May 20; up June 1; July 1, heading, 20 inches high; July 8, in bloom; August 10, select heads cut.

Finland, G. I. No. 582, from Finland: Seeded May 20; up June 1; July 3, heading, 22 inches high; July 10, in bloom; August 10, select heads cut; lodged somewhat.

Fiuland, G. I. No. 581, from central Fiuland: Seeded May 20; up June 1; frosted slightly June 9 and 10; July 3, heading, 22 inches high; July 10, in bloom; August 10, select heads cut; lodged some.

Trysil, G. I. No. 566, from Trysil: Seeded May 20; up June 1; July 1, heading, 20 inches high; July 10, in bloom; August 10, select heads cut; lodged some.

Liland, G. I. No. 565: Seeded May 20; up June 1; July 1, heading, 20 inches high; July 8, in bloom; August 10, select heads cut.

Bodoe, G. I. No. 586, from Norway: Seeded May 20; up June 1; July 1, heading, 18 inches high; July 8, in bloom; August 10, select heads cut.

Russian, G. I. No. 573, from Vologda, Russia: Seeded May 20; up June 1; July 3, heading, 16 inches high; July 10, in bloom; August 10, select heads cut.

The above 12 varieties were grown for the first time. In point of earliness they are very promising, being the earliest of all. But they showed a tendency to lodge even in this favorable season. All are bearded, but some heads became awnless at maturity. An effort will be made to develop this trait by selection.

Boehmes Beardless Hull-less Barley, S. P. I. No. 19851, hull-less: Seeded May 20; up July 1; July 11, heading; July 8, in bloom; August 6, cut for hay; made a very poor growth.

Oderbrucker, S. P. I. No. 10754: Seeded May 20; up June 1; July 6, heading, 25 inches high; July 15, in bloom; a few smut heads; August 19, select heads cut. This plat ripened unusually evenly.

G. I. No. 279: Seeded May 22; up June 2; July 1, heading, 18 inches high; July 8, in bloom; quite a few smut heads; August 10, select heads cut.

Abyssinian, G. I. No. 360, station seed: Seeded May 19; up May 31; July 11, heading, 24 inches high; July 15, in bloom; August 19, select heads cut. This plat was the finest of all barley grown this season. Very even growth, straw of good length, well colored, and heads plump.

Abyssinian, G. I. No. 361, station seed: Seeded May 19, up May 31; July 11, heading, 28 inches high; July 15, in bloom; August 19, select heads cut.

Abyssinian, G. I. No. 362, station seed: Seeded May 19; up June 1; July 10, heading, 27 inches high; July 18, in bloom; August 15, select heads cut. A two-rowed barley with black glumes when ripe.

Swedish, S. P. I. No. 19557, station seed: Seeded May 19; up May 31; July 1, heading, 25 inches high; July 8, in bloom; August 15, select heads cut.

Hull-less, S. P. I. No. 12709, naked, station seed: Seeded May 19; up May 31; July 7, heading, 24 inches high; July 16, in bloom; August 19, select heads cut.

Manshury, station seed: Seeded May 19; up June 2; July 11, heading, 30 inches high; July 15, in bloom; August 19, select heads cut. This is a tall-growing variety producing long heads, but often the heads are not filled quite to the tips.

Kashgar, S. P. I. No. 18922, from Pamir, station seed: Seeded May 20; up June 1; July 1, heading, 17 inches high; July 8, in bloom; August 14, select heads cut. An early, short-growing variety with only fair-sized heads.

Lapland, station seed: Seeded May 20; up June 2; July 11, heading, 30 inches high; July 15, in bloom; August 19, select heads cut.

No. 184, North Dakota Experiment Station: Seeded June 3; up June 13; July 14, heading, 22 inches high; July 21, in bloom; some smut; September 1, select heads cut. Short straw, but large, well-filled heads.

G. I. No. 88, S. P. I. No. 10583, S. P. I. No. 19852, and G. I. No. 87, all seeded May 22, failed to germinate.

OATS.

No. 90: Seeded May 20; up June 2; July 11, beginning to head, 15 inches high; July 17, in bloom; August 25, select heads cut. A black, promising variety. First year grown.

G. I. No. 500, from Norrland, Norway: Seeded May 20; up June 2; July 12, heading, 20 inches high; July 17, in bloom; August 19, select heads cut. First year grown. A black variety that promises to do well here.

G. I. No. 498, from Yakutsk, Siberia: Seeded May 20; up June 2; July 12, heading, 20 inches high; July 17, in bloom; August 19, select heads cut. A white oat grown for the first time.

Black Bell, S. P. I. No. 20463: Seeded May 20; up June 3; July 17, heading, 20 inches high; August 31, select heads cut.

North Finnish Black, North Dakota Experiment Station: Seeded May 22; up June 4; July 11, beginning to head, 18 inches high; July 17, in bloom; August 28, select heads cut. A tall growing oat; height 68 inches.

Golden, S. P. I. No. 20460: Seeded May 23; up June 4; July 16, heading, 20 inches high; July 21, in bloom; August 25, select heads cut.

Belyak, S. P. I. No. 10624: Seeded May 18; up June 8; July 1, heading, 19 inches high; July 26, in bloom; September 9, cut for hay. This is the only oat that failed to mature any seed. Very slow to germinate and grew very slowly.

Black Great Mogul, S. P. I. No. 20464: Seeded May 23; up June 6; July 20, heading, 25 inches high; July 30, in bloom; August 25, select heads cut. A fine-looking plat, but bearing short heads. Ripened very slowly. That which was left standing was caught by the frost September 9.

Ligowo, S. P. I. No. 20459: Seeded May 23; up June 4; July 20, heading, 22 inches high; July 25, in bloom; August 25, select heads cut. This was a fine plat.

Hvitling, S. P. I. No. 20458: Seeded May 23; up June 6; July 20, heading, 26 inches high; July 28, in bloom; cut September 10. Fully grown, but not ripe.

Probsteier, S. P. I. No. 20461: Seeded May 23; up June 4; July 20, heading, best 26 inches high; uneven growth due to the soil; July 28, in bloom; September 10, fully mature, but cut for hay.

White Probsteier, S. P. I. No. 20462: Seeded May 23; up June 4; July 20, heading, 20 inches high; July 25, in bloom; September 10, mature, but cut for hay.

Commercial feed oats sown on new land for hay: Seeded May 23; up June 2. Made a good growth only where stumps had been burned and on the wettest of the ground. Cut August 10, yielding about a ton from a little over an acre of ground.

Banner, station seed: Seeded May 19; up June 2; July 15, heading, 24 inches high; July 22, in bloom; September 1, ripening slowly; select heads cut.

Swedish Select, station seed: Seeded May 19; up June 2; July 14, heading, 25 inches high; July 17, in bloom; September 1, ripening slowly; select heads cut.

Burt Extra Early, station seed: Seeded May 19; up June 4; July 11, heading, 21 inches high; August 19, select heads cut; height, 38 inches. This and the Sixty-day oat appear very similar, both having very short straw and short heads.

Finnish Black, station seed: Seeded May 19; up June 2; July 11, heading, 19 inches high; July 17, in bloom; August 19, select heads cut; height 65 inches. This variety and North Finnish Black appear very similar.

Sixty-day, station seed: Seeded May 20; up June 2; July 11, heading, 20 inches high; July 15, in bloom; August 19, select heads cut.

Swedish White, S. P. I. No. 18245: Seeded May 22; failed to germinate.

From Eagle, Alaska: Seeded May 15; up May 28; July 11, heading, 14 inches high; July 15, in bloom; August 15, ripe and cut. Very similar oat to Burt Extra Early.

A photograph of a patch of fall oats is given herewith (Pl. VI, fig. 1).

RYE.

No. 281: Seeded May 23; up June 6; July 1, still in rosette stage; evidently a winter variety; it has made a very luxuriant growth and will be left over till next season.

EMMER.

G. I. No. 1529, from South Dakota Experiment Station: Seeded May 15; up May 27; July 11, heading, 24 inches high; September 1, select heads cut; heads short, but well filled. This plat made a fine showing throughout the season.

No. 305, from the North Dakota Experiment Station: Seeded May 15; up May 29; July 11, heading, 21 inches high; July 18, in bloom; September 9, ripe and cut. Heads very short.

S. P. I. No. 19235: Seeded May 22; up June 2; July 1, still in the rosette stage. Will be left standing till next season.

FIG. 1.—OATS RAMPART STATION.

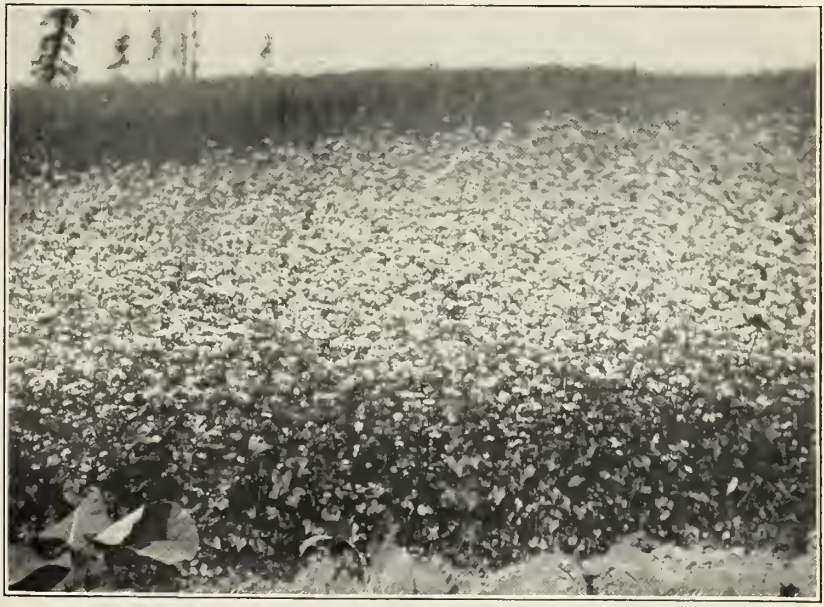

FIG. 2.—BUCKWHEAT, RAMPART STATION.

BUCKWHEAT.

Russian, station seed: Seeded May 22; up June 4; June 22, beginning to bloom; continued to bloom until the middle of August. Harvested August 20, yielding a fair crop of well-ripened grain (Pl. VI, fig. 2).

GRASSES AND FORAGE CROPS.

June 11 a piece of wet ground of about an acre in extent was seeded to a mixture of alsike clover, timothy, and meadow fescue, with oats for a nurse crop. The clover has made very little growth, but the timothy and meadow fescue have a good start. The oats made a fair crop of hay, perhaps a little over a ton. Pending further investigations, it would appear that grasses make a better start if sown without a nurse crop.

The grasses named were seeded in June, 1906, wintered successfully for the second time, but none of them made as vigorous a growth as last year. This may be due largely to the lack of sufficient moisture. Seed was gathered from Kentucky bluegrass, meadow foxtail, tall meadow oat grass, and timothy. Redtop and English bluegrass produced seed very sparingly, and orchard grass and smooth brome grass did not mature any seed.

CLOVER.

Alsike: June 3 about one-twentieth of an acre was broadcasted and covered with a light drag; all up June 11. Though not a healthy color, it has made a good growth, covering the ground well by fall.

White clover: The yard about the house and a bank back of the house was seeded June 3 to a mixture of white clover and Kentucky bluegrass. Both came up well and have made a good growth, especially in the yard, aided doubtless by a light coat of manure.

KALE.

Thousand Headed, S. P. I. No. 19698: Seeded May 22; up June 4; seed drilled in open ground and plants thinned to proper distance July 7. Made a vigorous growth, but did not form any heads. Likely of no economic value here.

VICIA FABA.

S. P. I. No. 11998: Drilled in open ground June 3; up June 19. Sent up vigorous stalks to a height of 2 feet; blossomed and grew pods, but did not mature any seed. Seemingly of no value in this latitude.

CANADIAN FIELD PEAS.

S. P. I. Nos. 20465, 20466, and 20467 were planted in drills May 22; up June 8. No. 20465 began blooming July 11; No. 20466, July 18; and No. 20467, July 15. The first two varieties are as sweet and good when cooked as any garden pea. All made a rank growth and podded freely, but none ripened any seed, though some of it may be mature enough to grow.

MILLET.

Red Voronezh Proso, S. P. I. No. 9424; Red Orenburg Proso, S. P. I. No. 9423; Black Voronezh Proso, S. P. I. No. 9425; and yellow Manitoba Proso were seeded in small plats May 23. Did not come up till June 1, and had made a very short growth when killed by frost. Apparently of no economic value here.

POTATOES.

Thirty-five varieties were tried this year for the first time. Thirty of this number were from the Sitka Station, where they had been grown. The remaining 5 varieties were grown at Skagway, Alaska, by H. D. Clark. Owing to the small amount of seed no considerable area could be planted. It is intended to give the varieties a further and thorough comparative test under the conditions existing here, since the importance of the potato crop warrants the outlay of considerable time and energy along experimental lines.

As mentioned elsewhere, potatoes suffered from the drought, especially where put in poor ground, though even where the ground had been given a coat of stable manure the previous year the crop was light. The yield of increase ranged from six to ten fold.

All potatoes were planted May 21. The soil was in excellent condition. By June 24 most of them were up. August 6 some of the tubers were large enough to use. A black fungus disease was observed this year, attacking the stems near the surface of the ground. The potatoes were dug September 11, after the vines had been killed by frost. The varieties are as follows:

Carman No. 3, Sitka: August 5, beginning to bloom; vines thrifty; some good-sized, smooth tubers; fair yield; 9 per cent first grade.

Early Market, Sitka: July 22, beginning to bloom; vines fairly thrifty; 91 per cent first grade.

Snow Flake jr., Skagway: August 6, beginning to bloom; not thrifty; potatoes large and smooth; 95 per cent first grade.

White Beauty, Sitka: August 6, beginning to bloom; vines spindling; potatoes averaged small; light yield; 90 per cent first grade.

White Mammoth, Sitka: August 6, beginning to bloom; vines small and spindling; light yield of small potatoes; 90 per cent first grade.

Garfield, Sitka: August 5, beginning to bloom; small vines, light yield; 60 per cent first grade.

Eureka, Sitka: August 5, beginning to bloom; vines not thrifty; 60 per cent first grade.

Ohio Junior, Sitka: July 30, beginning to bloom; tubers fair size; 90 per cent first grade.

Vornehm, Sitka: August 4, beginning to bloom; fair yield; 75 per cent first grade.

Pats Choice, Sitka: August 5, beginning to bloom; vines very spindling, practically a failure, producing no potatoes of marketable size.

Extra Early Triumph, Sitka: July 5, beginning to bloom; thrifty vines; good yield; 93 per cent first grade.

Early Ohio, Sitka: July 22, beginning to bloom; fair growth, good yield; 93 per cent first grade.

Hamilton Early, Sitka: August 5, beginning to bloom; fair yield of rather small potatoes, but averaging well; 90 per cent first grade.

Vigorosa, Sitka: July 5, 1 vine in bloom; very uneven growth; light yield; 83 per cent first grade.

Red River Early Ohio, Sitka: Only a partial stand; in bloom August 1; potatoes small; 75 per cent first grade.

Early Harvest, Sitka: Only two hills came up; seed badly wilted when planted; practically a failure.

Banner, Sitka: Poor stand; vines spindling; practically a failure.

Burpee Early, Sitka: Affected by stem rot; July 6, beginning to bloom; very light yield; 87 per cent first grade.

Lincoln, Sitka: Made a vigorous growth at beginning of season; affected by stem rot; July 29, in bloom; tubers good sized; 90 per cent first grade.

Early Michigan, Sitka: July 29, beginning to bloom; vines small; fair yield; 87 per cent first grade.

Bovee, Sitka: Affected by fungus disease; July 22, beginning to bloom; light yield of small tubers; 86 per cent first grade.

Freeman, Sitka: Not a full stand; August 4, beginning to bloom; only fair yield; 71 per cent first grade.

Extra Early Pioneer, Sitka: July 19, beginning to bloom; good yield of large tubers; 88 per cent first grade.

Extra Early, Sitka: August 5, beginning to bloom; tubers averaging well, but small size; 71 per cent first grade.

Extra Early Ohio, Sitka: Affected by stem rot; July 22, beginning to bloom; small vines; potatoes fair sized; 87 per cent first grade.

Norway No. 2, Sitka: Large thrifty vines; July 30, beginning to bloom; small tubers; 50 per cent first grade.

Gold Coin, Sitka: Affected by stem rot; July 22, beginning to bloom; potatoes small; 66 per cent first grade.

Russian Variety, Sitka: July 30, beginning to bloom; large thrifty vines; only 40 per cent first grade.

Norway No. 3, Sitka: Fair growth of tops, potatoes small; in bloom July 30; 50 per cent first grade.

Norway No. 1, Sitka: July 30, beginning to bloom; fair yield; potatoes small; 66 per cent first grade.

Irish Cobbler, Sitka: Made a strong growth and yielded well; began blooming July 30; 92 per cent first grade.

Irish Cobbler, Eagle: July 18, beginning to bloom; thriftiest vines of any in the field; fair yield, potatoes good size; 88 per cent first grade.

Extra Early Eureka, Skagway: July 20, beginning to bloom; fairly thrifty; some fair-sized potatoes, but averaging small; 78 per cent first grade.

Gold Coin, Skagway: July 18, beginning to bloom; fair growth of tops; some good-sized tubers; 80 per cent first grade.

Early Ohio, Skagway: Affected by stem rot; as a whole this variety made the best showing of any; July 22, beginning to bloom; large potatoes and good yield; 87 per cent first grade.

Burbank, station seed: July 31, beginning to bloom; made a good growth only where the ground had been fertilized the previous year; light yield; potatoes averaging rather small.

GARDEN CROPS.

Nothing special was attempted in gardening, field crops demanding first attention, and by the time these were in the season was getting rather advanced for best results. The ground was given a surface coat of manure, but insufficient rain prevented its having much effect.

A hotbed produced an abundance of early lettuce and radishes and some peas; also sets of cabbage, cauliflower, and broccoli. A couple of hills of cucumbers were planted and left growing in the hotbed. These vined and fruited freely, some of the fruit attaining a length of 6 inches by the middle of August.

Brussels sprouts: Seeded in open ground June 3; up June 16; made a good growth, but did not form any heads.

Broccoli: Seeded in open ground June 3; up June 16; practically a failure. Plants transplanted from the hotbed produced a few small heads.

Cabbage—Early Jersey Wakefield: Seeded in open ground June 3; up June 15; very few formed heads large enough to use. That which was transplanted from the hotbed did much better, producing several fair-sized heads.

Cauliflower: Plants started in hotbed were transplanted to open ground June 9; all made a vigorous growth, but only a couple of small heads were produced.

Carrots: Scarlet Horn, Chantenay, and Long Orange were seeded June 3; up June 19; made a slow growth at first, but later did well—in fact, turned out best of anything in the garden.

Ruta-baga: Seeded June 3; up June 15; made a vigorous growth of tops and some good-sized roots, but average small.

Cress: Seeded June 2; up June 16. This made an early growth. During the latter part of the summer it ran to seed, which thoroughly ripened.

Kale, Dwarf Green Curled: Seeded June 2; up June 16. This has made a good growth, though the leaves are rather small.

Turnip, Golden Ball: Seeded June 2; up June 11; grew slowly, none of the roots attaining large size, but all are firm, clean, and good. The same is true of the Petrowski, which was seeded on same date.

Beans, Long Yellow Wax: Seeded June 2; up June 24; grew slowly; August 10, large enough for use. Vines spindling and turned yellow.

Parsley, Moss Curled: Seeded June 2; did not germinate.

Onions: Round Yellow Danvers, Early Red Flat, and New White Queen were seeded June 2; up June 19, showing but a partial stand. Of the three, Yellow Danvers was the best, many of the bulbs equaling the diameter of a half dollar. Some bulbs of the previous season's growth were set out June 2. These grew no larger than those from seed, but were ready for table use considerably earlier.

Beets, Detroit Red and Bastian Early Turnip: Seeded June 2; up June 16; did not grow well, and when pulled, September 12, the roots were still small.

Parsnip: Seeded June 2; did not come up.

Radishes: None of the 5 varieties seeded in the open ground did well except French Breakfast. These grew tender and juicy, but were somewhat attacked by root maggots. Other varieties were Long Scarlet, Short Top, Early Scarlet Turnip, Half Scarlet, and Giant White Strasburg.

Lettuce: All Seasons, Passion, and Early Prize Head were seeded June 2; up June 12, showing a poor stand. Of the three, Early Prize Head was by far the best, not only in point of earliness, but also crisper and better appearing.

Peas, Alaska: Station-grown seed and seed from Congressional distribution were planted side by side in two rows extending across the garden; no difference could be seen in their growth. Planted June 2; up June 15; made a feeble growth from the start and vines appeared sickly throughout; pods well filled and matured early, but the crop was light.

Quinoa, Common and Real: Seeded June 21; up June 15; both varieties grew vigorously, bloomed, but did not mature seed. Good for greens when young.

NURSERY STOCK.

Nothing additional has been done in this line during the last year. The following wintered with results as noted below:

Red currant, native: 43 plants; all came through in good shape, but have not made much of a growth this summer.

Red currant, nursery grown: 4 plants; all froze to the ground, but have made a vigorous growth from the roots.

Red raspberry, native: 43 plants; froze back to within 6 inches of the ground; made a vigorous growth and bore a little fruit, which was large and delicious. Canes grew to a height of 3 feet by fall.

Red raspberry, nursery-grown: 8 plants; froze back to within a foot of the ground, some entirely. The canes that partly survived bore a little fruit, good, but no better than from the native.

Strawberry, native: Came through the winter in fine shape and have made a vigorous growth. They bloomed freely, but did not set much fruit. What fruit ripened was well flavored, but small.

Yellow Siberian Crab: 4 trees winterkilled to the ground, but have started again from the roots.

Yellow Transparent: 3 trees; winterkilled to the ground. All have started from the root and have made a fair growth: Best growth, 2 feet.

Florence crab: 1 tree; entirely winterkilled.

Okabena apple: 3 trees; froze to the ground; all have started again and have made a fair growth.

FLOWERS.

A number of pansy plants grown from seed during the summer of 1907 wintered in perfect condition unprotected. They began blooming as soon as the snow left (May 8), and were a mass of bloom till covered with snow again. An abundance of ripe seed was produced.

In like manner a dozen carnation plants lived through the winter outdoors. These did not begin blooming until the first week in August. Before the ground froze four of the best plants were potted and taken into the house, where they continued blooming uninterruptedly.

REPORT OF WORK AT THE FAIRBANKS STATION.

By J. W. Neal, *Superintendent.*

This being the first year of field operations, and owing to the primitive conditions in a northern latitude, together with the great amount of work necessary in establishing a new station, our experiments have been conducted on a very small scale.

The writer arrived in Fairbanks March 19 and opened camp in a small and cheaply constructed board shanty on the farm two days later. The ground was then covered with nearly 3 feet of snow and the weather very cold. The shanty proved too cold for sleeping quarters, and the roadhouse keeper near by, Mr. W. W. Estes, kindly offered sleeping room, which was accepted with appreciation. As soon as conditions would permit a horse was procured and the station equipment hauled out to the farm, it having been shipped from Seattle last fall and stored in Fairbanks. Later some horse feed and 3,000 feet of lumber were hauled out. A temporary summer barn, 20 by 24 feet, was built, and the seed, feed, and small tools stored in one side, leaving stall room for four horses, which had been transferred from the Geological Survey to this station and wintered by the Orr Stage Company. The fields were still covered with water from the melting snow, and manure was hauled during spare time from Ester Creek, 5 miles away, until the ground could be worked. The weather continued cold and showery all through May, making the season unusually late. Field work was begun, however, the last

week in May, although the soil was still very wet and boggy in many places, water standing in the furrows over several acres. (Pl. VII.)

A small tract of the driest ground was put in fair condition and seeded to all varieties of grain at hand May 25. Duplicate plats of these varieties were seeded on a higher elevation May 27.

On May 26, 900 pounds of seed potatoes were received from the Rampart Station. The potatoes arrived in excellent condition for planting, being already sprouted, but the ground could not be put in condition until June 4, when the planting began. There being no available funds with which to hire help before July, 1 acre was planted to potatoes and the remaining 9 acres cleared, fenced, broken, and sown to the various grains.

Forty-five acres were cleared and partly fenced during the summer. A barn 32 by 30 feet, with 16-foot eaves, is now under construction. This building affords room for 10 head of horses and 15 tons of hay.

Comfortable living quarters and implement sheds are much needed. A small root cellar will be built in connection with temporary winter quarters. About half of the clearing has been broken. All of the old ground will be fall plowed and as much more of the new ground as possible before the freeze up.

VEGETABLES.

Vegetables of nearly every kind are being extensively grown in and around Fairbanks, and no attempt in this line was made except to plant and cultivate the potatoes and some cabbage. A few turnips were sowed in the open field.

Potatoes: Thirty-two varieties were planted from June 4 to 7, inclusive. The stand was exceptionally good, though many hills were just coming up on July 1. A few hills were affected with a fungus which caused the vines to rot off at the ground. The earliest hills all over the plat were blooming by August 1. The vines did not make a thrifty growth, except on a few ash spots where brush had been burned in clearing the ground. Stable manure was applied in the row over about one-fourth acre, but the season being very dry through June, July, and August, it did not improve the crop materially, though a part of the manured ground yielded a much heavier crop of tubers than any part of the plat not fertilized. About 50 per cent of the tubers are of fair market size. The ash spots yielded well in every instance, and the tubers are much larger, with very few below the market size. The vines on the low ground were killed August 31 by a heavy frost, the first perceptible frost of the season. The next killing frost occurred September 8, killing all the potatoes throughout the country, the ground at the station being frozen nearly an inch deep on the nights of September 8, 9, and 10, damaging potatoes in the ground that lay near the surface. Only a small percentage of the crop has been dug at this date, and it is impossible to give a detailed report. Many acres of potatoes were planted in and around Fairbanks this year; but owing to the unusually dry season the yield is much lighter than usual, and with few exceptions the tubers are correspondingly small.

FIG. 1.—BUILDING SITE AND CHARACTER OF TIMBER, FAIRBANKS STATION.

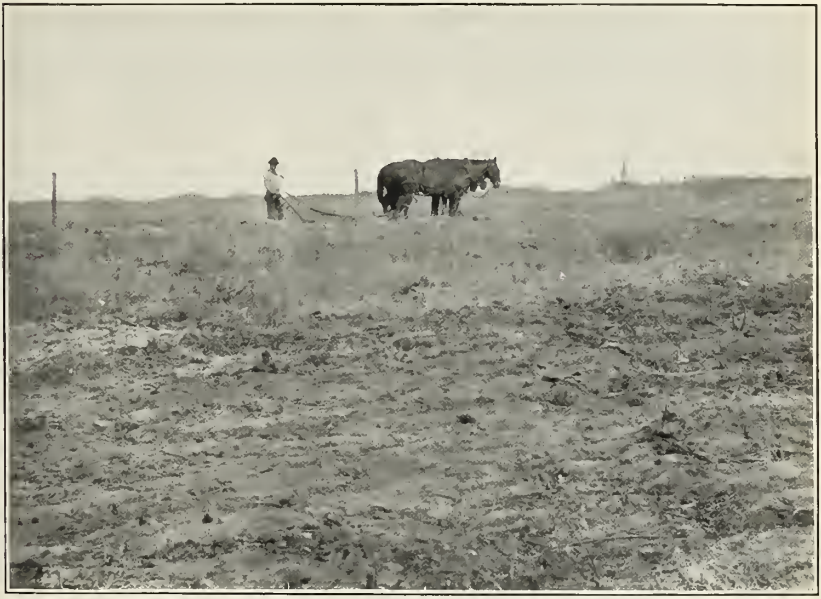

FIG. 2.—BREAKING VIRGIN SOIL, FAIRBANKS STATION.

Cabbage: Owing to the newness of the soil the cabbage at the station was not a success, though many plants made small heads, the largest being estimated at 5 pounds.

A great amount of cabbage has been grown this season in the many gardens about town and is retailing at 20 cents a pound. Ten-pound heads are common, and heads were seen on the market almost twice as large; 15-pound heads are not uncommon.

Turnips: Purple Top and Petrowski were sown broadcast June 8. Both made very small roots except on an ash spot; these made fair-sized turnips. The Purple Tops showed evidences of the root maggot, while the Petrowski seems to be entirely free from it.

GRAIN CROPS.

The seedings of May 25 and 26 were on low ground near the railroad, while the seedings of May 27 were on hill land of northern exposure.

Barley No. 386 (Tennessee winter): Seeded May 25; up May 31; made good bottom growth, covering the ground. It being a winter variety, no stems were sent out until very late in the summer; these few stems grew 18 inches high and headed, but set no grain. Two small plats of this variety were seeded August 15; up in a few days, making fair fall growth.

Chevalier barley No. 10584, from Sweden: Seeded May 25 and 27; did not germinate.

Manshury barley (Minnesota No. 6, from South Dakota): Seeded May 25 and 27; up May 31 and June 3, respectively; both seedings headed by July 15; grain in the dough and straw ripening August 1. All seedings of this variety had matured sufficiently to harvest by August 15, the first seeding being a little in advance and ranked second with other varieties in ripening. The growth was very irregular, being from 6 to 40 inches, as is invariably the case with new ground in this country. One-fourth acre of birch hill land, southern exposure, was seeded to this variety May 28, after being well disked. This tract was never plowed, but it had been well cleared of stumps and moss so that it disked up finely. The grain on this tract made an average growth of 36 to 40 inches and yielded a fair crop of well-matured grain.

Barley No. 279: Seeded May 25 and 27; up May 31 and June 4, respectively; both seedings headed by July 15, growth from 6 to 36 inches. Both seedings were ripe enough to harvest by August 15, the later seeding being a little in advance. This variety ranked first in ripening.

Hanna barley No. 5793, from South Dakota: Seeded May 25 and 27; up May 31 and June 4, respectively; both seedings nearly in full head July 15; grain in the dough August 15 and straw mature enough for hay; growth 8 to 24 inches. Both seedings were ripe enough to harvest August 25, the first seeding ripening a little in advance.

Manshury barley, from North Dakota: Seeded May 25; up May 31; heading July 15; this variety proved to be misnamed; it was a two-rowed barley; grain in the dough August 15 and straw ripening; ready to harvest by August 25. A field plat of this variety was seeded June 1. It made little growth except on ash spots made in burning brush. These spots made a rank, thick growth of 4 feet and the crop is estimated to make at the rate of 3 tons of hay to the acre. A small percentage of the straw was getting golden when a heavy frost occurred August 31. Many heads were ripe enough for seed if they had been cut before the frost.

Hull-less barley No. 12709: Seeded May 25 and 27; up May 31 and June 4, respectively; both seedings nearly in full head July 15; growth 6 to 20 inches

high; grain in the dough and straw getting golden on both plats August 15. All matured by August 25.

Princess barley No. 10583, from Sweden: Seeded May 25 and 27; none germinated.

Hull-less barley No. 19851, from Geneva, Idaho: Seeded May 25 and 27; up May 31 and June 3, respectively; both seedings had about all headed by July 15; grain in the dough August 1; growth 18 to 36 inches; straw then getting golden. Both plats were nearly ripe enough to harvest by August 15, the first seeding being a little in advance. This variety ranked third in ripening.

Beardless barley No. 19852, from Geneva, Idaho: Seeded May 25 and 27; up June 1 and 4, respectively. Only a small percentage of this seed germinated. Both plats were nearly headed July 15; standing 24 to 40 inches high; grain of first seeding in the dough August 15, and straw getting golden; the later seeding was then nearly in the dough; straw green. The first seeding had matured by August 25; later seeding kept green and was frosted September 8.

Probsteier oats No. 20461, from Sweden: Seeded May 25 and 27; up June 2 and June 5, respectively; heads showing on first seeding July 15; both plats in full head August 1; growth 15 to 46 inches; grain in the milk August 15, and in the dough August 31, when frosted.

Oats No. 19851, not listed: Seeded May 25; up June 2; heading July 15; grain nearly in the dough and straw ripening August 15; growth 8 to 12 inches; grain matured before frost.

Swedish White oats No. 18245: Seeded May 25 and 27; up June 2 and 5, respectively; first seeding beginning to head July 15; both in full head August 1; 12 to 36 inches high; first seeding, grain in the milk August 15; later seeding, grain half filled. The first seeding had nearly matured when frosted August 31; later seeding nearly mature when frosted September 8.

Black oats No. 20463: Seeded May 25 and 27; up June 2 and 5, respectively; both seedings in full head August 1; growth 12 to 34 inches; grain in the milk August 15, none matured.

Hvitling oats No. 20458, from Sweden: Seeded May 25 and 27; up June 2 and 5, respectively; a few heads showing on second seeding July 15; both plats in full head August 1; growth 12 to 36 inches high; grain in the milk on both plats August 15, and straw turning on first seeding. No seed matured.

Belyak oats No. 10624: Seeded May 25 and 27; up June 3 and 5, respectively; no heads showing July 15; both plats in full head August 1; first seeding, grain in the milk August 15; second seeding, grain nearly filled. First seeding was frosted August 31; second seeding frosted September 8. No seed matured.

North Finnish Black oats: Seeded May 25 and 27; up June 2 and 4, respectively; both seedings started heading July 15; in full head August 1; 36 to 48 inches high; grain nearly in the dough and straw ripening on both plats August 15. All of the first seeding matured, also a portion of the second seeding. Considerable smut was present in all seedings of this variety. One-fourth acre of birch hill land was seeded to this variety May 28 under the same conditions and treatment as the Manshury barley on a similar tract. This seeding made a very heavy crop all over the ground, standing from 40 to 60 inches. The grain was in the milk and straw beginning to ripen August 15. The frost of August 31 did no perceptible damage to this plat, but several days of cold, rainy weather followed, which caused nearly the whole crop to lodge badly. The crop was still quite green when cut for hay after the heavy frost of September 8.

Oats No. 20459, not listed: Seeded May 25 and 27; up June 2 and 5, respectively; just started heading on both plats July 15; in full head August 1; growth 24 to 40 inches high; in the milk and straw turning August 15. All of the first seeding matured, also a portion of the later seeding.

Black oats No. 20464, from Sweden: Seeded May 25 and 27; up June 2 and 5, respectively; neither seeding had started heading July 15; both in full head August 1; growth 8 to 34 inches high; grain in the milk in both plats and straw of first seeding was turning August 15; first seeding frosted August 31; second seeding frosted September 8. No seed matured.

Golden oats No. 20460, from Sweden: Seeded May 25 and 27; up June 2 and 5, respectively; started heading July 15; both plats in full head August 1; 8 to 44 inches high; grain in the milk on both plats August 15, and straw turning. The first seeding matured fair seed.

White Probsteier oats No. 20462, from Sweden: Seeded May 25 and 27; up June 2 and 5, respectively; heading July 15; in full head August 1; growth 8 to 34 inches high; grain in the milk August 15, straw of first seeding then turning; grain of first seeding had nearly matured when frosted August 31; second seeding frosted September 8.

Sixty-day oats: Seeded May 26; up June 5; heading July 15; grain nearly in the dough and straw ripening August 15; 15 to 36 inches high; seed matured by August 25.

Red Fife wheat, from Brookings, S. Dak.: Seeded May 25 and 27; up June 2 and 5, respectively; both plats heading July 15; grain in the milk August 15. The straw grew 6 to 20 inches high, very fine and wiry; heads very small; grain still green when frosted August 31. No seed matured.

Durum wheat, from North Dakota: Seeded May 25 and 27; up June 3 and 5, respectively; heading July 15; grain in the milk August 15, and straw turning. The grain was still soft when the heavy frost occurred August 31.

Black winter emmer No. 19235: Seeded May 25 and 27; up June 3 and 6, respectively; the ground was well covered on both plats by July 15. It being a winter variety, no stems were sent out. One plat will be kept to ascertain whether a spring seeding will live through the winter. Two plats were seeded August 15; up in a few days, but the growth is slow and will hardly make sufficient start to live through the winter.

Rye No. 280, from South Dakota: Seeded May 25; up June 3; in full head July 15; 36 to 46 inches high; grain in the dough August 15; harvested September 3; seed fairly well matured.

Swedish winter rye No. 19556: Seeded May 25 and 27; up June 3 and 5, respectively; both seedings made excellent bottom growth, covering the ground. One plat will be retained with the emmer. Two plats of this rye were seeded August 15; up in a few days, but making very slow growth.

Two plats of winter wheat were seeded August 15 and September 1.

A small plat each of timothy and alsike clover were seeded August 15.

Briefly summarizing this report, the first killing frost occurred August 31 on the low-ground experiments and September 8 on the hill land.

Six varieties of barley, five varieties of oats, and one variety of rye matured. Hanna No. 279 was first to ripen, followed by Manshury, Hull-less No. 19851, Hanna No. 5793, Hull-less No. 12709, and Beardless No. 19852 in their respective order.

Sixty-day oats and oats No. 19851 ripened about together, followed by Finnish No. 20459 and No. 20460 in their respective order.

Rye No. 280 matured fair seed.

REPORT OF WORK AT THE COPPER CENTER STATION.

By C. W. H. Heideman, *Superintendent.*

CLIMATIC CONDITIONS.

The season of 1908 was a record breaker as a cold, dry summer. The snowfall during the winter was very light, and on April 15 the ground was practically bare. Seeding began April 28 and was completed somewhat earlier than heretofore. Germination was very slow, and in some instances seeds of native grasses and some vegetables did not start until after the first rains in July. Soil temperatures taken at 6 inches below the surface did not rise above 43° F. until near the middle of May. For the growing season, May, June, July, and August, the mean temperature was 47.75° F., the maximum 59.03°, the mean minimum 36.47°. The maximum during this period was 76° on June 23, 24, and July 14. The minimum was 22° on May 7.

The total precipitation during the period was 2.88 inches. The greatest monthly rainfall was 1.83 in July. Rain fell on eighteen days; the greatest in twenty-four hours was 0.87 inch on July 23. During the period called the "growing season" there were seventy-seven clear days, one partly cloudy, and forty-five cloudy days.

During the first nineteen days in May the temperature went below the freezing point each night. Killing frosts occurred June 9 and 10, July 21, August 4, 23, 26, and 30. Up to July 10 there had been less than an inch of precipitation for the five months preceding.

A comparison with similar data for the year 1907 would show the adverse conditions with which this station has to contend; nevertheless, it is these adverse conditions that are necessary to assist in the main work of the station—that of breeding by selection a race or strain of grains better adapted to Alaskan conditions.

PEDIGREE PLANT BREEDING.

All strains of grain under experiment at this station matured seeds, with the exception of wheat. Of these the earliest heads were saved, and seeds from early heads of same plants were saved as a reserve in case of failure the following year, also seeds for museum specimens.

The plats of pedigree plants are carefully watched during the entire season and their behavior noted. Plants uninjured by summer frosts are marked. The earliest head to appear is marked, as well as the earliest general plants.

In no instance has the earliest head to mature failed to be the head that was first to appear. In the course of time seeds of the original, or first-generation plants, will be planted to determine if any gain has been made in the desired direction.

Careful record is kept of temperatures of the soil at various depths and of the air, and a study is being made to determine if possible the number of heat units required to mature the various grains.

FIG 1.—YAKUTSK BARLEY.

FIG. 2.—CHITTYNA BARLEY.

FIG. 3.—CROSSBRED BARLEY, BEARDED.

FIG. 4.—CROSSBRED BARLEY, SMOOTH.

There are but few data, if any, in regard to the heat required to complete the growth and mature grain in this or any extreme northern latitude. There is no doubt that definite heat requirements do exist for each species or variety, but there are so many factors that influence the life and development of plants under outdoor conditions that it will be difficult to establish thermal constants as a basis for comparison.

Long-continued low temperature would probably increase the total number of degrees of available temperature required to complete the cycle of growth. The temperature of the soil and excess or lack of moisture would also have a tendency to increase or decrease the apparent ratio between units of time and thermal units.

NEW CREATIONS.[a]

As noted in last year's report, an attempt was made to cross Pamir S. P. I. No. 18922 barley with Champion. A small quantity of Pamir barley was sent this station for test. It was labeled "Barley from Himalaya Mountains, grown at an elevation of 11,000 feet, the earliest barley in the world." This variety looked very promising from the standpoint of earliness, but it was a very dwarf variety, as well as being bearded.

Champion, as we have it, is an early, strong-growing, beardless variety that has matured at this station every year since 1905. Twenty seeds were obtained from this cross, of which 17 grew. Two of these plants resembled the Champion, 5 of them were bearded, 1 hull-less, 5 of them black, 1 failed to mature seed, but the rest were early and are quite promising. The result of this first hybrid seed is remarkable in that it produced offspring more promising for Alaska work than either of their parents (Pl. VIII, figs. and 4).

A few seeds of barley collected by the writer in the garden of Hon. F. B. Howard, Coldfoot, Alaska, in 1906, were grown at the station the past two seasons. This barley made phenomenal growth and is very promising. In the absence of knowledge as to its variety it has been named Chittyna (Pl. VIII, fig. 2).

A gray or nearly white sport of Finnish Black oats was discovered last year in one of the pedigree beds, and it appears to be one of the most promising varieties of oats grown here.

For the purpose of identification in future and of simplifying the records hereafter, each variety of cereal under test will have a generation sign after the name or number—thus the letter A indicates first generation from station-grown seed; B, the second generation, etc.

EFFECT OF FROSTS.

On July 21 the temperature fell to 23° F. near the surface of the ground. On low ground several acres of our main field of oats were badly injured. The pedigree plats were on slightly higher ground, and but little damage was done to barley and oats, but wheat, which was in the hard dough stage, was blasted and badly injured. In some instances a seed or two matured on these and some of the later heads.

VEGETABLES.

With the exception of potatoes, the vegetables grown this season were good and generally satisfactory.

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[a] The letters S. P. I. preceding a number stand for Seed and Plant Introduction and G. I. stand for Grain Investigations, both offices in the Bureau of Plant Industry, U. S. Department of Agriculture.

KALE.

Dwarf Green Curled, Congressional distribution seed: Planted in open ground April 28; made good growth, fit for table July 15; made plants averaging 5 to 8 pounds by September.

Siberian, seeds from Henderson: Planted in open ground April 28, made good growth. This variety is a more vigorons grower, with coarser foliage, than the Dwarf Curled.

KOHL-RABI.

Large White, Congressional seed: Planted in open ground April 28, ready for table August 1.

Purple Vienna, seed from Henderson: Planted in open gronnd May 12, ready for table Jnly 25. This variety appears hardier, earlier, and better than the white.

CABBAGE.

Early Jersey Wakefield, Congressional seed: Planted in open ground May 1, made good growth during July and August, ready for table August 20. A satisfactory variety.

PARSNIPS.

Hollow Crown, Congressional seed: Planted April 28, failed to germinate.

PEAS.

Alaska B, station seed: Planted April 27, ready for table July 15. The frost of July 21 injured them badly. Pods from later blooms matured August 20.

Canada field, S. P. I. Nos. 16130 and 19389: Planted May 18, up June 8; made good, strong growth; badly injured by frost July 21, but recuperated and bloomed later. No seeds matured. Growth was vigorons and sufficient for green manuring.

CARROTS.

Half Long Orange, Congressional seed: Planted May 11, failed to germinate.

Danvers Half Long, seed from Henderson: Planted April 28, few seed germinated, made good growth in Augnst and September.

Half Long Scarlet Chantenay, seed from Henderson: Planted April 28, few seed germinated, made good growth in August and September, very satisfactory.

Long Orange Improved, seed from Henderson: Planted May 9, none germinated. Considerable carrot seed was planted for horse feed; owing to the drought bnt very few seeds germinated until late in July, when it rained. These latter were a complete failnre. Our seasons are probably too short for large yield, bnt when there has been snfficient moistnre carrots have done fairly well.

BEETS.

Detroit Dark Red, Congressional seed: Planted April 28, up May 20, made good growth. An excellent variety.

Eclipse, Electric, and Egyptian, seed from Henderson: Planted April 28, up May 20. All made good growth. Many showed a tendency to run to seed. Ready for table August 25.

LETTUCE.

All Seasons, Congressional seed: Planted April 28, ready for table June 15.

Passion, Congressional seed: Planted April 24, ready for table June 15.

Tennis Ball, seed from Henderson: Planted April 28, ready for table June 20. This was the only variety that did not run to seed prematurely.

PARSLEY.

Moss Curled, Congressional seed: Failed to germinate.

ONIONS.

Round Yellow Danvers, Congressional seed: Planted April 27, up June 4, made feeble growth, none large enough for use.

RADISH.

The following varieties were planted from April 28 to May 9: Half Long Scarlet, Early Scarlet Turnip, White Olive Shaped, Rose China Winter, and Half Long Black Spanish. All were badly infested with root maggot, and all showed a tendency to run to seed. But very few were fit for table.

TURNIPS.

Petrowski, S. P. I. No. 19554: Planted May 1, made fine growth, smooth and entirely free from maggot; average weight of roots, 3 to 4 pounds.

Gratscheff, S. P. I. No. 19555: Planted May 1, made fine growth, considerably affected by root maggot; average weight of roots, 4 to 5 pounds.

RUTA-BAGA.

Golden Heart, seed from Henderson: Planted May 9, made fine growth, averaged 3 to 4 pounds.

Iceland, S. P. I. No. 19795: Planted May 7, made fine growth, averaged 2 to 3 pounds.

Turnips and ruta-bagas were a very fine crop this year. Not so badly infested with root maggots as in previous years.

Petrowski, as in 1907, was the only variety entirely free from maggots. Turnip seed planted as late as June 1 will produce good roots in this vicinity.

POTATOES.

Seed of 10 varieties from Sitka Experiment Station and station-grown seed of 4 varieties were planted May 20; nearly all were up by June 16, and many were in bloom by July 17. The heavy frost of July 21 killed them down to the ground. Many plants started again, but were injured by frosts of August 4 and 23; none matured.

BEANS.

Dwarf Stringless and Early Mohawk, Congressional seed: Planted May 20, up June 16; all killed by frost July 21.

MUSTARD.

Fordhook Fancy, Congressional seed: Planted April 28, up May 19, ready for greens June 25; all in bloom June 30.

Chinese, seed from Henderson: Planted April 28, up May 19, ready for greens June 25; all in bloom July 1.

Cress, Congressional seed: Planted April 29, up May 15, ready for table June 25.

Watercress, seed from Henderson: Planted in fall of 1907 and this spring in small streams and springs on the station grounds; did not germinate.

CELERIAC.

Large Smooth Prague, seed from Henderson: Planted May 14; did not germinate.

ALLIUM.

Wild Onion: Seed of a native onion found growing on sand and gravel bars throughout the interior of Alaska was planted May 1, up June 8, made good growth during the season, but was scarcely large enough for table use the first season's growth.

Notwithstanding the extreme dry conditions of the soil during the first half of the summer, vegetables did fairly well. A tendency to run to seed prematurely was noticed in many varieties. Kohl-rabi and kale showed this tendency for the first time in our experience; fully 10 per cent of these varieties bloomed and were in a fair way to mature seed the first season.

FIELD CROPS.

WHEAT.

Saskatchewan B,[a] station seed: Planted April 29, up May 18, heading July 15; none matured.

Blue Stem B, station seed: Planted April 29, up May 18, heading July 15; none matured.

Early Riga C, station seed: Planted April 29, up May 18, heading July 8, first ripe August 18; only few seeds matured.

Ladoga B, station seed: Planted April 29, up May 18, heading July 12, first ripe August 20; only few seeds matured.

Romanow B, station seed: Planted April 29, up May 18, heading July 15, first ripe August 20; only few seeds matured.

Wild Goose, seed from Manitoba: Planted April 29, up May 19, heading July 10; none matured.

Red Fyfe, seed from Manitoba: Planted April 29, up May 21, heading July 12; no seed matured.

The injury to wheat by frost was greater in every case than the injury to barley and oats growing side by side.

On July 20 the wheat was apparently as far advanced as the barleys. A few days after the severe frost of July 21 it was noticed that most of the heads that were in or beyond the soft dough stage were blasted. Here and there a head showed that one or two grains were uninjured. From these and later heads seed was saved to continue the pedigree work.

BARLEY.

Pamir A, S. P. I. No. 18922, station seed: Planted April 20, up May 18, heading June 27, first ripe August 5; all matured.

Champion B, station seed: Planted April 29, up May 19, heading July 1, first ripe August 15, all matured.

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[a] The letters A, B, and C after varietal names indicate the first, second, or third generation of seed produced at the station.

Manshury C, station seed: Planted April 29, up May 20, heading July 4, first ripe August 15, all matured.

Sisolsk B, station seed: Planted April 29, up May 18, heading June 28, none matured, probably injured by frost July 21.

Swedish, S. P. I. No. 19557 A, station seed: Planted April 29, up May 18, heading June 29, none matured.

S. P. I. No. 12709 A, station seed: Planted April 29, up May 18, heading July 1, ripe August 21.

Hull-less Black B, station seed: Planted April 29, up May 18, heading July 4, first ripe August 20. This variety was injured by frost of July 21.

Manchuria B, station seed: Planted April 29, up May 20, heading July 6, no seed matured.

Yakutsk G. I. No. 574, seed from North Dakota Station: Planted April 29, up May 19, heading July 1, first ripe August 13. A very promising variety. (Pl. VIII, fig. 1, p. 48.)

Bjoerkoe Island, S. P. I. No. 20607, seed from North Dakota Station: Planted April 29, up May 20, heading July 10, first ripe August 20.

Russian, S. P. I. No. 20786: Planted April 29, up May 19, heading June 26, first ripe August 12. A stronger growing variety than Pamir and nearly as early.

Hybrids of Pamir and Champion, station seeds: Planted April 29, up May 19, heading from July 1 to 15, earliest to ripen August 15. All but one plant, which was very late, matured seed.

S. P. I. No. 19852: Planted May 7 on upper bench land, up May 21, heading July 5, killed by frost July 21.

Under the conditions existing this year all the barleys proved hardier than wheat. Pamir has but one quality, viz, earliness, to recommend it for general planting in Alaska. The Russian variety, S. P. I. No. 20786, is better. Of the bearded barleys, Yakutsk is apparently all that can be desired. Champion and the new beardless hybrids are the most promising of all.

OATS.

Finnish Black B, station-grown seed: Planted April 30, up May 20, heading July 5, first ripe August 15, all matured.

S. P. I. No. 15857 A, station seed: Planted April 30, up May 20, heading July 1, first ripe August 11, all matured.

S. P. I. No. 10624 A, station seed: Planted April 30, up May 20, heading July 15, first ripe August 25.

S. P. I. Nos. 18245, 20458, 20459, 20460, 20461, 20462, 20463, and 20464: Planted on upper bench land May 7. On account of drought the seeds were slow in germinating, the plants headed out while still very small, and all were injured by frost July 21. No seeds were saved.

Sport of Finnish Black, station seed: Planted May 4, up May 22, heading July 4, first ripe August 17. A vigorous white-seeded variety resembling the Finnish Black, in other respects promising.

Wild oats, seed from Minnesota Station: Planted April 30, up May 18, heading July 18, first ripe August 18. Growth was very vigorous.

RYE.

No label, seed from Bureau of Plant Industry: Planted April 29, up June 1, heading July 1. No seeds matured.

Spring, seed from Sitka Station: Planted April 29, up May 20, heading June 26. No seeds matured.

FLAX.

Seed from Bureau of Plant Industry: Planted May 7, up June 16, killed by frost July 21.

LEGUMES.

Yellow as Gold alfalfa, seed from Utah: Planted May 28, up June 10, made very feeble growth.

Alsike clover, Congressional seed: Planted May 2, up May 22, made feeble growth.

Red clover, Congressional seed: Planted May 2, up May 21, made feeble growth.

White clover, Congressional seed: Planted May 18, up June 15, made feeble growth.

Astragalus, Hedysarum, lupine, and a number of species of native legumes were planted May 1. On account of drought but very few seeds germinated until after a rain late in July. Many seeds did not germinate at all. Growth on all species was very weak. Nothing in their behavior this season would warrant the hope that among our native legumes either a promising forage or fertilizing plant may be looked for. All the species when immature are greedily eaten by horses and are apparently of sufficient bulk for green manuring. The Hedysarums required several years from seed before attaining any size. It is difficult to get seeds of our native lupines in any quantity on account of weevil infesting the seed pods and the irregularity in ripening of the spike. One species of leguminous plant that promised best of all matures several small seeds in a tough inflated pod, and it is very difficult to thrash them. Seeds of this species were planted in the pod as well as hand-picked seeds. On account of drought none of these germinated. Another season will be required to report intelligently on these native legumes.

GRASSES.

Tall oat grass, S. P. I. No. 20471: Planted May 2, up May 27, made fair growth.

Tall meadow oat grass, S. P. I. No. 19697: Planted May 2, up May 27, made good growth, heading out July 10.

Meadow fescue, S. P. I. No. 20472: Planted May 2, up May 27, fair growth.

Festuca elatior pratensis, S. P. I. No. 17059: Planted May 2, up May 27, fair growth.

Lolium perenne, S. P. I. No. 19724: Planted May 2, up May 26, fair growth.

Redtop, S. P. I. No. 19860: Planted May 2, up May 27, good growth.

Velvet grass, S. P. I. No. 19288: Planted May 2, up May 26, vigorous growth.

Rat tail, S. P. I. No. 21025: Planted May 2, up June 7, good growth.

Agropyron occidentale, S. P. I. No. 21500: Planted April 24, up June 7, good growth.

Festuca rubra, seed from Reykjavik, Iceland: Planted May 4, up June 7, fair growth.

Alopecurus pratensis, S. P. I. No. 18414: Planted May 2, up June 8, made good growth.

Bromus inermis A, station seed: Planted May 18, up June 10, made good growth.

Festuca elatior: Planted May 2, up June 8, fair growth.

Poa trivialis, S. P. I. No. 18327: Planted May 2, up June 10, fair growth.

Reed fescue, S. P. I. No. 20473: Planted May 28, up June 17, fair growth.

Lolium italicum: Planted May 28, none germinated.

Bromus pacificus: Planted May 2, none germinated.

Danthonia semiannularis, S. P. I. No. 21024: Planted May 2, none germinated.

Chewing's fescue, S. P. I. No. 21023: Planted May 2, none germinated.

Orchard grass, S. P. I. No. 20470: Planted May 28, none germinated.

Timothy, S. P. I. No. 15669: Planted May 2, up May 27, feeble growth.

Timothy, S. P. I. No. 10282 (1904 seed): Planted May 2, up May 27, feeble growth.

Timothy, seed from Eagle, Alaska: Planted May 4, up May 27, fair growth.

Agropyron tenerum, S. P. I. No. 19726: Planted April 24, up June 7, good growth.

Agropyron tenerum A, station seed: Planted April 24, up June 6, good growth.

Agropyron tenerum, native seed: Planted April 24, up June 6, made good growth.

Agropyron pseudorepens: Native seeds of three distinct types of this valuable native grass collected at various altitudes, planted April 24, up June 6, made vigorous growth.

Alopecurus pratensis, native seed: Planted May 4, up June 9, made good growth.

Phleum alpinum, native seed: Planted May 14, up June 10, headed and made vigorous growth.

Deschampsia cæspitosa: Native seeds of three distinct types planted April 24, few seed germinated during August.

Calamagrostis langsdorfii: Native seeds of two distinct types planted April 24, few seeds germinated in August.

Seeds of 40 unidentified native species planted April 24 and in fall of 1907. Several species came up during June, but many seeds did not germinate until late in July and August. Will require another season to report intelligently.

Of the native grasses *Agropyron tenerum* has done the best and gives promise of value for Alaska. It is found sparingly throughout the interior and far north of the Arctic Circle. It is a good seed producer and a good yielder.

Deschampsia cæspitosa (Silver Top) and *Calamagrostis langsdorfii* (Blue Top), both valuable grasses, are found in meadows throughout the interior and even north of the Circle. The latter is a poor seed producer. A species of the Calamagrostis type, which I have temporarily labeled Black Top, produces seeds abundantly and is quite promising.

Phleum alpinum, a high altitude grass, has so far made a better showing than timothy from the States.

If but one of the above species makes good in Alaska under cultivation as does timothy in the States, Alaska need not complain. The past season was so dry and unfavorable that native grasses failed to come up to their usual standard under the prevailing conditions; hence no fair comparison can be made as to their behavior under cultivation.

WINTER GRAINS.

Amber winter rye A, station seed: Planted August 20, 1907, made fair growth and was in good condition to winter. The snowfall was unusually light, and several times during the winter chinook winds cleared the ground of snow. Nearly all winterkilled; no seeds matured.

Winter rye, S. P. I. No. 11268 A, station seed: Planted August 20, made fair growth. All winterkilled.

HORTICULTURE.

All efforts heretofore to introduce fruit trees and plants from the States were more or less failures. Attempts were made in years past to bring in trees and plants, but owing to poor and slow mail service and in some instances improper packing all were dead or nearly so before they reached the station in the interior. It seems difficult to make people in the States understand and comprehend that our seasons are somewhat the same as the Northern States. One correspondent held our nursery stock until June on the assumption that Alaska had but one season and that was all winter. Another wrote me on April 24 that he could not dig nursery stock on account of frost. On that very day I was busy planting seeds in the garden here.

Trees of Duchess, Wealthy, Yellow Transparent, and Red Astrachan apples, and Whitney and Transcendent crabs, also Fay Prolific and White Grape currants, and gooseberries were secured from Missoula, Mont., this season. These arrived in excellent condition, due to the system of packing and the fact that they followed instructions implicitly. All have made fine, healthy growth; many made new growth of 6 to 10 inches and are now in good condition to go through an Alaskan winter.

Several hundred plants of our native currants and raspberries were planted this spring and are doing well.

Seeds of red and white currants, wild black raspberry, wild gooseberry, and strawberries from Minnesota were planted May 4, but few of them germinated this season.

Seeds of our native and black and red currants, blueberries, etc., were planted late in August.

Rhubarb, Congressional seed; and Victoria rhubarb, seed from Henderson: Planted May 1, up June 3, made fine growth, and by August 20 were large enough for table use. Our hotbeds produce an abundance of pie and sauce material, and are apparently good for a number of years yet. Rhubarb has never winterkilled at this station.

Colossal and Palmetto asparagus, seeds from Henderson: Planted May 4, up June 15, made fair growth.

INDIAN GARDENS.

Efforts toward getting the natives interested in gardening were again successful. Ten plats were assigned to ten natives, who applied for garden space. Seeds of such vegetables most likely to give good results, mainly turnips, lettuce, and ruta-bagas, were furnished them, they doing all of the work of planting and after care.

These gardens yielded an abundance of vegetables, which were much appreciated by those whose main diet is salmon and tea, with occasionally fresh moose or sheep meat.

OTHER WORK.

During the past season the writer collected and prepared over 100 herbarium specimens in duplicate of our native plants and grasses. A list of the species, as determined by Mr. F. V. Coville, of the U. S. Department of Agriculture, is appended.

Two cases of specimens of grains and grasses were collected and prepared for exhibit at the Alaska-Yukon Exposition.

As a voluntary observer, daily and monthly meteorological data have been kept and transmitted.

As a voluntary observer for the Hydrographic Survey, daily measurements of the water stage of the Klutena and Copper rivers have been made and transmitted.

List of plants collected in Alaska during 1908.

1. *Alopecurus geniculatus fulvus* (Smith) Scribn.
2. *Puccinellia tenuiflora* (Griseb.) Scribn. & Merrill.
3. *Poa arctica* R. Br. (Apparently lower branches of panicle shorter than usual.)
4. *Trisetum spicatum* (L.) Richt.
5. *Sarastana odorata* (L.) Scribn.
6. *Carex concinna* R. Br.
7. *Bromus commutatus* Schrad.
8. *Agrostis hiemalis* (Walt.) B. S. P.
9. *Alopecurus californicus* Vasey.
10. *Pedicularis euphrasioides* Steph.
11. *Potentilla fruticosa* L.
12. *Epilobium angustifolium* L.
13. *Solidago oreophila* Rydb.
14. *Phaca americana* (Hook.) Rydb.
15. *Castilleja pallida* Kunth.
16. *Lappula redowskii* (Hornem.) Greene.
17. *Epilobium palustre* L.
18. *Comarum palustre* L.
19. *Solidago oreophila* Rydb.
20. *Achillea borealis* Bong.
21. *Senecio discoideus* (Hook.) Britt.
22. *Epilobium latifolium* L.
23. *Galium boreale* L.
24. *Cytherea bulbosa* (L.) House.
25. *Aquilegia brevistyla* Hook.
26. *Astragalus alpinus* L.
27. *Polemonium humile* Willd.
28. *Lysiella oblusata* (Pursh) Rydb.
29. *Parnassia palustris* L.
30. *Aragallus borealis* (DC.) Greene.
31. *Arabis hookeri* Lange.
32. *Erigeron multifidus* Rydb.
33. *Lupinus arcticus* Wats.
34. *Polemonium humile* Willd.
35. *Rubus arcticus* L.
36. *Dryas drummondii* Richards.
37. *Elæagnus argentea* Pursh.
38. *Pyrola rotundifolia incarnata* DC.
39. *Orchis rotundifolia* Pursh.
40. *Ledum groenlandicum* Oeder.
41. *Blitum capitatum* L.
42. *Gentiana acuta* Michx.
43. *Limnorchis hyperborea* (L.) Rydb.
44. *Erigeron cæspitosus* Nutt.
45. *Lycopodium annotinum* L.
46. *Primula stricta* Hornem.
47. *Saxifraga reflexa* Hook.
48. *Hedysarum mackenzii* Richards.
49. *Rhododendron lapponicum* (L.) Wahl.
50. *Anemone drummondii* Wats.
51. *Ribes hudsonianum* Richards.
52. *Lychnis affinis* Vahl.
53. *Anemone hirsutissima* (Pursh) Britt.
54. *Pelasites sagittata* (Pursh) A. Gray.
55. *Lepargyrea canadensis* (L.) Greene.
56. *Alnus* sp.
57. *Potentilla emarginata* Pursh.
58. *Arctous alpina* (L.) Niedenzu.
59. *Salix* sp.
60. *Equisetum arvense* L.
61. *Arctostaphylos uva-ursi* (L.) Spreng.
62. *Androsace chamæjasme* Host.
63. *Potentilla nivea* L.
64. *Alsine longipes* (Goldie) Coville.
65. *Anemone richardsoni* Hook.
66. *Capnoides pauciflorum* (Steph.) Kuntze.
67. *Erigeron multifidus* Rydb.
68. *Equisetum scirpoides* Michx.
69. *Aragallus pygmæus* (Pallas) W. F. Wight (*Astragalus pygmæus* Pallas. Astrag. 66, t. 54, 1800).
70. *Salix arctica* Pallas.
71. *Cassiope tetragona* (L.) Don.
72. *Lycopodium complanatum* L.
73. *Ranunculus purshii* Richards
74. *Mertensia paniculata* Don.
75. *Rosa acicularis* Lindl.
76. *Cardamine pratensis* L.
77. *Arnica alpina* (L.) Olin.
78. *Taraxicum taraxicum* (L.) Karst.
79. *Eriophorum opaeum* (Bjornstr.) Fernald.
80. *Cytherea bulbosa* (L.) House.

List of plants collected in Alaska during 1908—Continued.

81. *Cypripedium guttatum* Swartz.
82. *Corallorhiza corallorhiza* (L.) Karst.
83. *Saxifraga tricuspidata* Retz.
84. *Valeriana capitata* Willd.
85. *Aragallus borealis* (DC.) Greene.
86. *Viburnum pauciflorum* Pylaie.
87. *Rubus chamæmorus* L.
88. *Rubus arcticus* L.
89. *Moneses uniflora* (L.) A. Gray.
90. *Galium boreale* L.
91. *Equisetum arvense* L.
92. *Arabis holboellii* Hornem.
93. *Draba cana* Rydb.
94. *Senecio lugens* Richards.
95. *Pleurogyne rotata* (L.) Griseb.
96. *Agrostis idahoensis* Nash (awned form).
97. *Festuca elatoir* L.
98. *Poa arctica* R. Br.
99. *Festuca rubra* L.
100. *Dryas drummondii* Richards.
101. *Carex pratensis* Drej.
102. *Carex incurva* Lightf.
103. *Juncus arcticus* L.
104. *Dryas integrifolia* Vahl.
105. *Geranium erianthum* DC.
106. *Arenaria capillaris* Poir.
107. *Cerastium alpinum* L.
108. *Andromeda polifolia* L.
109. *Juniperus sabina* L.

REPORT OF WORK AT THE KODIAK LIVE-STOCK AND BREEDING STATION.

By M. D. Snodgrass, *Superintendent.*

The work at this station has been carried on as outlined in the annual report for 1907.

The building progressed rapidly, notwithstanding the unfavorable season. The lack of transportation facilities often put the work at a disadvantage, but the work with live stock was more than gratifying, and the outlook for work along that line is most favorable.

WORK OF THE SEASON.

Since the last annual report the work of the station may be briefly summed up as follows: Feeding and caring for the herd of Galloway cattle during the past winter, spring, summer, and fall; building a shed, 16 by 30 feet, during the early winter; a trip to Kenai, Alaska, in April for the station equipment, team of horses, and the remainder of the cattle, consisting of 1 four-year-old Galloway bull, 2 yearling bulls, and 6 native cattle, all of which were transferred to this station.

In May work was resumed on the improvement of roads, fencing of hay land, and breaking up land for crops. In the latter work little progress was made, owing to the lack of proper tools for the work. Forty acres of meadow land, at the head of Calsinsky Bay, were cleared of dead timber and alders, so as to make it possible to cut hay with a mowing machine.

The early summer was given to clearing a building site for a dairy barn, hauling gravel for cement foundation, digging a well, and superintending the getting out of 35,000 feet of native lumber at the Government sawmill at the hatchery on Letnik Lake, Afognak Island, and transporting the lumber to Kodiak, a distance of 35 miles, half of it being sent to Calsinsky Bay, some 15 miles south of Kodiak. The lumber was carried from Letnik to Kodiak by a small schooner, while that taken to Calsinsky Bay was by lighter, carrying about 6,000 feet at a trip and towed by a coal-oil launch.

The work of building was begun on July 22. At Kodiak a dairy barn, 30 by 60 feet, with solid cement foundation, was built, with capacity for 16 head of cows, 35 tons of hay, grain room, and storeroom for all farm machinery.

The buildings at Calsinsky Bay consist of a hay barn, 24 by 50 feet, with capacity of 45 tons and fitted with hay fork, carrier, and track; a silo, 26 feet in diameter and 16 feet deep, with solid cement foundation; a cattle barn, 24 by 100 feet, one-third of which is floored with poles; and a cottage, 16 by 32 feet, for the foreman.

The hay barn and cattle barn were built entirely of native lumber. The cottage and dairy barn were also built of native lumber, except the roof covering, which is of galvanized corrugated iron roofing.

The stave silo was purchased in the States and shipped to the station. Enough lumber and building material is left on hand to put up a dairy building, 16 by 32 feet, at Kodiak. This building will be erected during the winter and spring.

About 65 tons of native hay was cut and cured at Calsinsky Bay, also 65 tons of beach-grass silage. The hay barn was filled and the remainder was stacked in the field. At Kodiak only about 5 tons of hay was secured, owing to the shortness of the hay crop near the town.

A lighter of 12 tons capacity was built to carry the building materials and farm machinery to Calsinsky Bay. This was used also for carrying hay to Kodiak from the bay.

The larger part of the Galloway herd was driven to Calsinsky Bay for the winter, taking 3 days to make the drive, October 12–15.

The work for the winter at the bay will be feeding and caring for the cattle, clearing more meadow land, and fencing meadow, while at Kodiak erecting a dairy building and breaking up more land for grain, hay, and root crops will occupy the time.

CLIMATIC CONDITIONS FROM A STOCKMAN'S STANDPOINT.

The fall months of 1907 were unusually wet, yet the cattle held their flesh well and were in good condition when winter came. The month of November was cold and wet. Four and one-half inches of snow fell during the month, but it did not lie upon the ground long at any one period, frequent rains melting it soon after it fell. There were 10 clear days and 20 cloudy, rain falling in measurable quantities on 15 days. The weather in December was rather an improvement over that of November. From the 1st to the 20th cloudy weather prevailed, with considerable rainfall and 5½ inches of snow, while from the 21st to the 31st there were 7 clear and 2 partly cloudy days. During this period the coldest weather of the season came. The thermometer registered as low as 3° above zero on December 28. Westerly winds prevailed at this time, and the sun shone brightly for the most of the cold period. Stock ranged in the woods, and had to be fed but about one-third of the time, and that only when the snow covered the grass. January was slightly colder, on the whole, than December. Snow laid upon the ground at a depth of from 1 to 5 inches, except in places where it drifted in the woods and along ravines, until January 23, when rain melted the snow. February was warmer, and gave us 10 clear days and 11 partly cloudy days, with only 8 cloudy days. Snow laid upon the ground February 8–15 to a depth of from 2 to 6 inches. The week following this was rainy, while the latter part of the month was clear. In March the snow went off nearly as soon as it fell, giving the stock a good opportunity to range in the woodland pasture. During the 3 months the cattle at the station were fed about a one-third ration of hay and depended upon browsing for the rest of their

feed. The rainfall for the month was slight as compared with the other winter months. April weather continued about the same as that of March until April 21–23, when the greatest snowfall of the season came, some 11 inches falling in 3 days. The snow went off in 5 days and was followed by heavy rainfall. On the whole, April was colder than March, and was by far more disagreeable for stock. The weather in the month of May was the hardest on live stock of the whole year. Cold rains from the northeast prevailed for the month, with but 1 clear day and 3 partly cloudy days upon which there was no snow or rain. The total rainfall was not so great, but the constant drizzle made it very trying on the cattle, and the cold retarded the growth of grass. Pasture was very backward until June 1, when it shot up rapidly, giving good pasture by June 10. June was considerably warmer, and with but a slight rainfall, 1.63 inches for the whole month, most of which fell on the last day. No clear days in July, and with rain in measurable quantities on 21 days made it a cooler month than June, the total precipitation for the month being 6.64 inches. Grass grew fairly well and stock fattened rapidly. August was warmer, but with a larger rainfall than July, giving fine growing weather for hay. The weather was favorable for haymaking from August 31 to September 24, there being 15 days without rainfall and 11 days on which there was but slight rainfall. During the larger part of this period westerly winds prevailed. This aided greatly in curing hay. The sun shone more during those 25 days than in any other one period in the year. Days recorded as partly cloudy in the weather report were often ideal haying days. The clouds usually cleared up by 9 a. m., giving excellent drying weather for the most of the time. From September 25 to October 10 rainy weather prevailed, followed by comparatively dry and fair weather for the remainder of the month.

Summary of weather record from November 1, 1907, to October 31, 1908.

Month.	Temperature.			Precipitation.		Character of weather.			
	Maximum.	Minimum.	Mean.	Rain.	Snow.	Clear.	Partly cloudy.	Cloudy.	Rain or snow.
	°F.	°F.	°F.	*Inches.*	*Inches.*	*Days.*	*Days.*	*Days.*	*Days.*
November	47	13	32.26	7.70	4.5	10	.....	20	15
December	46	3	30.43	6.50	5.5	7	2	22	13
January	46	9	29.67	4.37	6.5	7	15	9	16
February	49	17	33.39	5.65	11.5	10	11	8	15
March	49	14	34.13	2.84	8.5	6	10	15	15
April	50	14	33.99	4.87	17.5	0	16	14	17
May	58	26	39.58	6.05	Trace.	1	16	14	27
June	78	30	48.68	1.63	.....	5	15	10	9
July	69	35	48 80	6.64	.....	0	12	19	21
August	73	35	51.98	7.04	.....	7	13	11	16
September	77	27	45.70	3.82	1.0	3	20	7	15
October	54	18	37.90	6.91	1.0	7	11	13	13
Total	.....	.....	.....	64.02	56.0	63	141	162	192

The total precipitation for the year—November 1, 1907, to October 31, 1908—was 64.02 inches. The snowfall for the year was 56 inches. There were 63 clear days, 141 partly cloudy days on which the sun shone for a part of the day, and 162 cloudy days. Rain or snow fell in measurable quantities (0.01 inch or more) on 192 days.

There was a larger percentage of clear days during the period from October 1 to March 31 than during the growing season; but the sun shone on more days during the latter season and the days were almost twice as long, thereby making the growing season longer than it seems at first thought. By referring to the

table below it will be seen that the number of cloudy days from October 1 to March 31 were 87, while from April 1 to September 30 there were 75; partly cloudy days for the two periods were 49 and 92, respectively, and the clear days were 47 and 16, making the total number of days on which the sun shone 96 for the former period and 108 for the latter. It must be remembered that the days are much longer in the latter period and that the actual number of hours of sunshine was twice that of the former.

The actual growing season for the year past was from May 1 to September 7, when the first killing frost occurred.

Comparison of clear and cloudy days throughout the growing and dormant seasons.

Month.	Clear days.	Partly cloudy days.	Cloudy days.	Month.	Clear days.	Partly cloudy days.	Cloudy days.
October	7	11	13	April	0	16	14
November	10	0	20	May	1	16	14
December	7	2	22	June	5	15	10
January	7	15	9	July	0	12	19
February	10	11	8	August	7	13	11
March	6	10	15	September	3	20	7
Total	47	49	87	Total	16	92	75

THE CATTLE AT THE STATION.

During the past year the Galloway cattle at this station have shown their ability to hustle for themselves in all kinds of weather. The herd came through the winter in first-class condition on less than half ration of hay. The calves were fed a little grain, as noted hereafter, and came through the winter in good flesh and made growth the whole time.

The increase in the herd for the year was, 13 calves born, 12 pure-bred Galloways, 6 heifers and 6 bulls, and 1 half-blood calf (see Pl. III, fig. 2, p. 16), and 9 head transferred from the station at Kenai, Alaska, 1 four-year-old Galloway bull, 2 yearling bull calves, and 6 native cows and heifers.

Four head were sold, 2 yearling Galloway bulls for breeding purposes and 2 yearling steers for beef. Four cows died in the spring; 1 died of actinomycosis, or lumpy jaw, and 3 died of impaction of the third stomach, an account of which is given later on. There are now 60 head of cattle at this station, 53 pure-bred Galloways and 7 mixed bloods, or grade cattle.

THE WINTERING OF THE HERD.

Seventeen head of Galloways were turned into the woods north of the town of Kodiak, on October 31, 1907, to hustle for themselves. About 5 tons of native hay had been cut and stacked at a clearing in the woods for feed in case of heavy snowfall. The cattle were ranged in the woods until January 6. During that time 15 inches of snow fell and covered the pasture for about one-third of the time, and the cattle were fed at the stack in racks built around the stack. At this time the cattle were in good order, strong, and vigorous. Had there been more hay at that place to feed in time of necessity the cattle could have been ranged in the wood during all the open winter which followed.

On January 6 these cattle were brought back to the station and ranged in the woodland pasture for the remainder of the winter. They were fed native hay at stack in the pasture until February 12, and from that date until May 20 they were fed from 9 to 14 pounds alfalfa hay each daily, depending upon the

weather. The alfalfa hay was fed in a shed, open to the south and well sheltered from the wind by spruce trees. The feeding was done in the evening after the cattle had browsed during the day.

The spruce woods furnish excellent shelter for stock and are preferred to the shed by the cattle for the most of the time. Only the cold northeast rains would drive the cattle to the shed. The cattle, thus wintered, did much better than those sheltered at night for the whole winter and fed more liberally.

Twelve cows with sucking calves were ranged in woodland pasture during the day and sheltered at night in a shed open to the southeast, with good windbreaks on all sides, and floored with poles. Beginning on November 8, these cows were fed in the shed at night, 8 pounds alfalfa hay each daily, increasing the ration to 15 pounds hay daily by December 8. The calves were separated from the cows at night and sheltered in an old log house. They were fed 5 pounds hay and 2 pounds grain feed each daily, beginning on November 8. The hay ration was increased on December 26 to 18 pounds hay daily for the cows and 7 pounds hay for the calves. The grain ration for the calves was increased to 3 pounds each daily on January 1. On March 1 the hay ration for the cows was cut to 12 pounds and for the calves to 5 pounds each daily. From April 21 to April 25 the worst snowstorm of the year came. All feed in pastures was covered with several inches of snow. At this period the hay ration was nearly doubled for all the cattle. However, it did not last long. By May 1 the hay ration was reduced to 10 pounds for the cows and 4 pounds for the calves. A little oil-meal cake was added to the grain feed for the calves. From May 10 to May 20 the cows were fed 8 pounds grain feed and a little oil-meal cake in addition to the hay ration; then the hay was left off and the grain feed was given for a few days.

Rain fell almost every day from April 26 to June 4. Pasture was slow in coming, due to the cold, wet spring. On the southern slope of the mountains grass began to show by May 15, but it was thin, very tender shoots coming through the wet, dead grass. The cattle ranged high on the hillsides at this time of the season and were roving all the time. It is perhaps the most critical time in the year for stock raisers. The cattle are apt to go too close to the edge of the cliffs after green grass and fall off, very often maiming themselves or being killed. Another danger confronts the cattle raiser at this time of the year. In their search for the first green grass the cattle often eat such large quantities of wet dead grass as to cause impaction of the rumen and the manifolds, there not being enough green stuff to aid the digestive organs in caring for the load of dead, tough grass. Cattle allowed to run on the beach and feed on the seaweed are seldom bothered in this way. The seaweed acts as a laxative and is considered very good for cattle at this time of the year. By June 1 the pasture was fair. Grass grew rapidly from that date, and there was good pasture by June 10.

The summer pasture was good and stock fattened rapidly. The days in summer are long and cattle feed from eighteen to twenty hours every day. Young stock made rapid growth and were fat enough for beef by August 1, as were the cows in calf. Fall pasture is good, and stock that have ample range are fat until the snow comes. All of the cattle are in better order at this date (November 20) than at this time last year, due perhaps to the fact that they have become better acclimated than they were last year. None of the cattle has received any feed yet this fall except the cows which are milked. These are fed at night.

The cows calved in pasture during the summer months without a single case of difficult parturition. In stormy weather the cow is kept in a box stall where nothing can disturb her or her young.

LOSS AMONG CATTLE IN ALASKA.

There is often loss among cattle in this part of Alaska, due to perhaps two principal causes, falling off cliffs in early spring, and overeating wet, dead grass before there is enough green to aid digestion, resulting in impaction of the rumen, or, more often, of the third stomach. The former danger can be overcome by fencing around the dangerous places or by confining stock during the first weeks of new grass. To guard against impaction, cattle should not be allowed to graze on land where there is much long dead grass at the time the new and tender shoots of grass are first coming in the spring, more especially if the period is wet. The cattle are apt to gorge themselves with the undigestible, tough, wet grass in their attempt to get the green, and cause impaction, from which they seldom recover. There is no great danger on pastures where the grass has been eaten close the fall previous, but the safer way to guard against the trouble is to feed during this period without allowing the cattle to range. Less feed in the earlier part of the winter when stock are able to get more of their living off the mature grass and heavier feeding in the latter part of April and the whole month of May will carry cattle through the season safely and with little danger of loss. This method of feeding will be closely followed at this station the coming winter and spring.

In times past there were periods of considerable loss among the native cattle and the real cause was not known. Some thought that the cattle starved to death; even though they seemed to get all they wanted to eat, they often became weak and died. The real cause of death among cattle was discovered here at the station last spring.

On May 10 a 2-year-old heifer in splendid condition, though heavy in calf, showed signs of loss of appetite and a tendency to remain apart from the herd. Nothing was thought of it at first, but upon the second day she seemed weak. She was taken from the herd and confined in shelter and given a quart of castor oil as a purgative, without results. The following morning 1 pound Epsom salts and 2 ounces of Jamaica ginger dissolved in warm water were given as a drench and repeated again in the evening without results. The next morning, as a last resort, a veterinarian was called to perform rumenotomy. The paunch or rumen was badly bloated and hard. The contents of the rumen were carefully removed through an incision made on the left side, half way between the point of the hip and the last rib. The paunch was not packed as badly as was indicated by outward symptoms, but the contents were dry and hard. The cow seemed to be relieved for a few hours, but died the following day. Post-mortem examination showed that the principal seat of impaction was in the third stomach. The contents of this stomach were so hard, packed, and dry as to crumble in the hand. The mucus membrane lining the stomach was black and dead, the most of it coming out with contents when washing out the stomach.

Another cow, 3 years old and in good condition, though heavy in calf, was noticed to be off her feed. She was promptly treated to relieve the impaction, first by giving castor oil and later epsom salts. The impaction was partially relieved, but the cow died. Post-mortem examination showed the larger part of the third stomach to be packed very hard and the lining tissues dead, much of which came off at the touch of the hand.

Another cow not in calf showed signs of impaction and was treated promptly. The impaction was relieved and she seemed to be recovering for a couple of weeks, when severe diarrhea or scouring set in, which could not be checked. The appetite was good for two weeks after the scouring began, and signs of recovery seemed good, but gradually the scouring grew worse. Castor oil and

laudanum were given as a slight purgative to remove the cause of the trouble, then dry feed was used. Browned flour was fed for a while; boiled milk and Jamaica ginger were tried, all to no avail. After a month's illness, with no signs of recovery toward the last, the cow was killed, and post-mortem examination made. A thorough examination of the entire digestive tract was made. A small portion of the third stomach was still packed and considerable dead tissue in the lining of the stomach was found. This, no doubt, caused a loss of the digestive fluids of the stomach. The food was not properly digested and acted as a persistent irritant that could not be removed.

HAYMAKING AND PUTTING UP SILAGE.

The haymaking season was short this year, beginning on the last day of August; fair weather prevailed until September 25, during which time about 70 tons of hay was cut and cured, 65 tons at the head of Calsinsky Bay and 5 tons at Kodiak. Sixty-five tons of beach grass silage was put up at the bay immediately after hay making. An extra team was hired during this time and the work pushed as fast as possible. One team was kept hauling hay to the barn as soon as enough was cured to begin on, and the other team was kept on the mowing machine or hayrake for the entire period. It necessitates quick work to cut and cure hay and get it into shelter without getting it rained on. The practice of putting hay into small cocks as soon as dry enough to rake was followed at all times, thereby keeping the curing hay in best possible shape in case rain came. During the haying season there was not more than 5 tons of hay lost by winds or wet weather and only about 10 tons damaged to any considerable extent by rains. The most of the hay was gotten into the hay barn without getting wet during the curing period. A hayfork with carrier was used in the hay barn, thereby reducing the work of unloading and stowing the hay by at least two-thirds. Two men with one team were kept hauling during all favorable weather, one driving the team and the other handling the fork while unloading. A day's hauling could be put in the barn without stowing away until evening or the next morning, while the hay was too damp to haul from the field. Two men were kept cocking hay and a third pitching in the field and cocking between loads. In case of a shower of rain the cocks would be opened as soon as the sun came out and the drying wind would soon put it in good shape for hauling.

While filling the silo with beach grass a man was kept in the silo scattering and tramping the grass so as to keep it evenly distributed over the silo. It is necessary to do this in order to reduce the air space in the silage and get proper conditions for fermentation. The beach grass was cut during wet weather and hauled directly to the silo. The more water on the grass the better. As the silo was being filled several barrels of water were poured over the silage. Owing to the late date at which the silo reached Kodiak it was impossible to get it filled before frost came. About 65 tons were secured this season.

Beach grass should be cut for silage soon after July 15, and in so doing it will be up and out of the way for hay making, which usually comes about August 1.

The outlook for successful work with live stock in this region is very bright and deserves attention of every citizen of Alaska, even though he is not directly interested in stock. It should be possible for people to get beef without having to depend upon the boats from the States. There is ample feed for thousands of cattle and sheep on these islands, where there is nothing to-day except a few foxes and bear. It is true that conditions differ from those of the States, but live stock will live here and do well under proper management.

WORK AT THE FRYE RANCH.

Work at the C. H. Frye ranch has been carried on along the same lines as last year. Unfavorable weather in the early spring made it impossible to do much toward breaking up new land. Tame grass was almost a failure this season. The yield of native hay was not so good as last year's, but the weather was more favorable at haying time. Seventy-five tons of hay and about 450 tons of beach-grass silage was put up this season.

Thirty-five calves were raised this season and are in good condition for the winter. All the cattle did well on the range this year and are in excellent condition at this date, December 5. All are on the range yet and have not required any feed so far this winter.

The sheep, which have again increased over 100 per cent this year, are doing excellently. Of late years there has seldom been any loss among the sheep from any cause. The lambs are large and strong and have made a wonderful growth. Wool from this herd brought 2 cents per pound above the market price in Seattle. It is free from dirt and is of fine texture. Practically no feed was given the herd the past winter, there being good grazing on the lowlands for most of the winter.

Five colts were raised this year. They made good growth and are doing well.

Mr. F. H. Rier, superintendent of the ranch, firmly believes in the sheep industry for this country. It will be a simple matter to put up enough hay for sheep any year, and they thrive in weather when cattle must be fed. There is much less care required in handling sheep than cattle, and they seem well suited to the country.

REPORTS FROM THE SEED DISTRIBUTION.

The station, through the cooperation of the Bureau of Plant Industry of the United States Department of Agriculture, has continued seed and plant distribution, and a considerable amount of vegetable and flower seed was sent to settlers throughout Alaska during the past season. A request for a report accompanies the seed, but a large majority of those receiving them do not take the trouble to send in their reports. It is hoped that there may be more information from this source another year. The following letters tell briefly the success that some of our correspondents have had with the seed sent them:

Fred Patching, Fortman Salmon Hatchery, Loring, Alaska, November 30, 1908.—The harvest being over, I drop you a few lines to let you know results. The season was the worst I have seen since I came here—backward and cold. Where formerly we had cabbage ready to use by July 15 this year it was Sep-

tember 2 before any (Early Jersey Wakefield) were ready for the table. Beans Grenello Rust Proof, failed to come up. Early Mohawk did well and did not rust. Beets, Dewings Blood Turuip, did well, grew to a good size, and were fine flavored. Crosby Egyptian did not do so well. Yellow Leviathan grew fairly well, but were not large. Broccoli, Early Large White French, did not do any good at all, and only about 2 per cent made heads about as large as hen's eggs by October 4. Cabbage, Early Jersey Wakefield, made good heads on about 50 per cent of the plants. All Seasons about 30 per cent headed, Marblehead Mammoth about 20 per cent headed, Mammoth Rock Red about 50 per cent headed. Ninety-five per cent of the cabbage was attacked by root maggots, which were picked by hand, and even then some of the plants died. Carrot, Early Short Horn, did well; also Early Scarlet and Danvers. Improved Short White did very well, and, though not as large as a year ago, were rather better shaped. Lettuce, White Summer Cabbage and Early White Cos, both did very well. Onions, White Portugal, did well, and I think every seed made an onion (used green). Parsley, Champion Moss Curled, did fine. Parsnip, Long White Dutch, only grew about one-half as large as usual. Peas, Alaska and American Wonder, did fine; Nott Excelsior did fairly well; Telegraph did well, grew over 6 feet and yielded well; Melting Sugar (edible pods) did well, but the pods were stringy. Spinach, Savoy Leaved and Improved Thick Leaved, did not do well. Turnip, Extra Early White Milan, did well. Rutabaga, American Purple Top, did well and measured 26½ inches in circumference. Perfection White and White Swede also did well. Radish, Early Scarlet and French Breakfast, both did well. Last year we tried strawberries, planting them on well-cultivated, well-manured bottom land, and they made a large growth of vine and lots of blossoms, but no fruit. This year we moved them up on a steep hillside that had not been cultivated or fertilized, and the vines made very little growth, but bore lots of berries. Apple trees made a fair growth, and basket willow grew nearly 3 feet. Raspberries did well, had lots of fruit, but were very sour. Evergreen blackberry made about 9 feet of growth, and at this date, November 30, has lots of berries, but none ripened. Swedish Select oats grew over 6 feet tall, but none ripened. Manshury barley grew about 5 feet and about half of it ripened. Potatoes on new ground, Early Ohio, did fine, yielding well and of good flavor, dry and white. White Mammoth, Banner Gold Coin, Burbank on old ground (fourth crop of potatoes on same ground) did not do very well and yielded only about one-third of a crop. Potatoes, I find, do best on new ground and, in fact, are about the only vegetable that do well on new ground. All others are better grown on old, well-fertilized ground. Fish is the best fertilizer.

E. O. Campbell, St. Lawrence Island, July 13, 1908.—[The following letter from Dr. E. O. Campbell, who has charge of the Government school and is superintendent of reindeer on St. Lawrence Island, in Bering Strait, is of particular interest in that it describes conditions which prevail there.]

It affords me great pleasure to thank you for the interest you have shown in our station in sending the seeds for garden and home use. But I fear all our efforts will prove futile for lack of soil. The village is located on a gravel bed, which extends for more than a mile in every direction. The refuse and offal from the native houses have formed soil in a few places, where grass and flowers grow, and we think that possibly some cottonwood or birch trees might grow. At least, we should like to try the experiment. We tried gardeniug for several years, and one year succeeded in getting one turnip about 2 inches in diameter and several services of lettuce. The radishes came up and made some top, but the roots did not develop. Some sweet peas, grown in the house, were put outside the house, and the wind whipped them so badly we had to

keep them in. They developed only two or three blossoms. Some pansies in the house at the present time have fine tops, but the blossoms look as if they would fall before reaching maturity, as did most of the pea blossoms. Some seeds given the boys at the reindeer camp have done better, for they have some soil there, but it is so far away that I could not give the matter the attention I wanted to. The shore was surrounded with ice on July 8, and for the past week we have had a cold fog hanging over the island, so it is not a very favorable place to get things to grow. The highest temperature we have observed since 1901, when we came, is 52° F. We had a maximum and minimum thermometer the first year, kindly supplied us by the man in charge of the observatory at Eagle, but in some unknown way the maximum was broken, and though we have tried several times to get new ones none have reached us. One year Captain Hamlet, in charge of the revenue cutter *Thetis*, brought us word that some instruments were on the way, but they never reached us. We have a large fresh-water lake near the village, deep enough to keep fish from freezing all winter, and if stocked with whitefish would be a great blessing to the people. Being interested in reindeer, you may be glad to know that we have a fine herd of about 400 deer here now, beginning with 70 left here by Dr. Sheldon Jackson in 1900. Considering the fact that there are no trees here to afford protection from the dreadful storms, the increase is fairly good, 111 living fawns this year.

E. R. Gray, Seward, November 15, 1908.—I received the package of trees and shrubs which you sent me last spring, and wish to make the following report on them: Everything lived and made a good growth. The large apple trees made a growth of from 8 to 16 inches, and the wood ripened well, so that I do not entertain any fears of winterkilling. The small apple trees made a small growth, and at this date the leaves are still hanging on. The trees will be covered by the snow and probably winter all right. The Cuthbert raspberries made a most excellent growth for the first year, sending up strong, vigorous shoots (7 to 10 to the plant) from 14 to 26 inches long, and the wood has ripened in fine shape. The gooseberries made a good growth, as of course they would. The currant bushes made the best showing of anything. This being a natural home for currants, they are sure to succeed under cultivation. The Ural willow made a very indifferent growth, yet the foliage seemed healthy all summer, and the leaves still cling to the branches. The soil is a mixture of half stable manure and muck from tide flats on top of gravel, the mixture being about 12 or 14 inches deep. I used plenty of water each day, as it has been a very dry season here. I raised in my garden here lettuce, radishes, peas, onions from seed, carrots, turnips, and cabbage. I also raised out-of-doors the most beautiful double and single poppies, large asters, pansies, sweet peas, roses, verbenas, and carnations.

C. E. Peterson, Sentinel Island Light Station, October 14, 1908.—Thanking you for the choice collection of seeds, I herewith send you report of my success for this season. On account of the cold, I did not get my young plants from cold frame into open ground until the latter part of June, and owing, no doubt, to the cold, rainy season, did not do as well as I expected if it had been warmer during summer. Cabbage and cauliflower did well, especially the Early Jersey Wakefield cabbage, and although the heads are not large, they are solid and good. Cauliflower mostly turned to seed before it matured. Carrots did better this year than any year previous. Ruta-bagas would have done well, only the maggots ate them before they matured. Turnips mostly eaten up by maggots. Spinach did not do well this year; only a few plants came up and went to seed. Kohl-rabi did not do well; mostly went to stalk and leaves. Parsley was excellent and made a prolific growth. Celery, White Plume, was

not set in open ground until June 29, and, while slow in growing, the plants are at this date still in the ground and doing well, though not as large as in former seasons. Self-Blanching celery did best from seed purchased from seed house. Peas, Alaska, gave a good crop. Lettuce, Deacon, gave excellent results. Radishes, Long Scarlet, gave good results. The currant bushes received in 1907 did well. Raspberries all bore fruit this year, and, while not plentiful, the berries were of excellent quality. Out of the apple trees received in 1905, five are still alive, but doing poorly. From 25 inches growth last year they have only added from 2 to 6 inches this year. Out of the six apple trees you sent me in 1907, I saved four Whitney crabs. They grew last year 26 inches, and 37 inches this year. All kinds of berries do well on this island. Our potatoes yielded well this year, but most of the potatoes are watery. Early Ohio is best, and the variety from Thomas Knudsen's ranch is also good. The basket willows do very well. Rhubarb did very well this year, but parsnips were poor.

David C. Liles, Nome, July 20, 1908.—In reporting my experiment in gardening, I must say that considering the weather and short season, I have a fine garden. This has been a very backward season. My place is on sand, but I have a good well with which to irrigate. I have peas in bloom. They grew about 2½ feet high and I think they will mature, for they are looking fine. My beets have a fine appearance. They are about 4 inches high at this time. Carrots look pretty well. My cabbage is of good color and some have begun to head. My leeks were a failure; salsify, a failure also. Climate is too uncertain. Radishes excellent. I had fine crops of onions raised from seed. Lettuce grew very large, some as high as 8 inches outdoors. Climate hot in July and very dry.

John Kchoe, Tanana, August 6, 1908.—I understand the Department of Agriculture is encouraging the tillage of land by supplying samples of seed grain and vegetables to settlers. From observations made during eight years in the north land, I am satisfied that it is possible to make a success of farming in the Tanana Valley, and on hill land, where the ground is not too abrupt so as to wash from rainfall. The south slope of the uplands has good natural drainage and gets the full benefit of the sunshine that insures an early and quick growth. Impressed by the advantages that the market for farm produce offers, I have availed myself of the opportunity to take a homestead and intend to cultivate 8 or 10 acres next year. I have most of it cleared at present, and will plow it this fall. I intend to experiment with grain, and I believe that fall wheat sown in August will mature here, and barley and oats will mature from spring sowing, also peas. I would like to get a sample of these grains, with some varieties of vegetables.

Henry S. Tibbey, Coal Harbor, July 28, 1908.—On June 28, 1907, there arrived an assortment of 35 fruit plants and seedlings, viz, 11 apple trees (3 crab apple, 1 Dart, 3 Wealthy, 3 Strawberry, 1 Beecher Sweet), 2 plums, 2 cherries, 1 horse-radish. The crab apples are doing fairly well. The plum and cherry arrived dead, as did also the horse-radish and the raspberries. A few of the currants survived and will always do well in this climate. The same statement will, under proper conditions, apply to the raspberry. Of a former lot that you sent us all finally succumbed except 2 white currants, which are now fine, large bushes hanging full of fruit, and 2 raspberries, well grown and doing fine, but without yet reaching the stage of fruitage. Once rooted well in the soil, all of the varieties sent will do well and prove a great blessing if manipulated by an expert. Lack of knowledge on my part accounts for disappointing results.

F. E. Graves, Fairbanks, October 20, 1908.—I planted the seed sent me by Mr. J. W. Gasser, of the Rampart Station. They all grew, but it was late for

some of the seed, such as celery and Brussels sprouts. Will try them again next year. This ground is new and needs fertilizer. In April I got a package of seed from Mr. F. Gearhart, of Fairbanks, which contained kale, Stone tomatoes, Deacon lettuce, White Icicle radish, summer squash, and sweet corn. All seeds grew. The kale, lettuce, and radishes did fine; the tomatoes only got nicely in bloom, and corn got about 18 inches high. The summer squash had 1 squash the size of your fist, which did not mature before frost. I had three kinds of peas—Little Gem, which were earliest; Telephone; and Alaska. They all matured. Rhubarb from seed did fine. One plant grew stalks 12 inches long, not including the leaf, which was very large. I have about 100 plants. Carrots did fine, the Short, the Half Long, and the Long all made good roots. Cabbage, Early Dwarf Flat Dutch and Early Winningstadt, did well considering the care and new ground. Beets, Eclipse, those that came did well. Onions mostly died from drought, though some grew as large as a dollar. Yellow Danvers and Early Red Flat did about the same. Two other varieties failed entirely. Kohl-rabi, was planted too late, but would have done fine in a longer season. Had some to use. Parsnips, Hollow Crown, did fine. I had two varieties of turnips, Yellow Aberdeens and Purple Top Strap Leaved; both did well. Ruta-bagas did well considering time of planting and drought. Dwarf bean, Stringless Green Pod, came up slow and late, but made some string beans. Potatoes, native Early Rose, 100 pounds were planted; native White, 50 pounds; and outside White, two kinds, all grew well. I planted 350 pounds potatoes and got in return 1,050 pounds. I set out 38 strawberry plants which bore 3 saucers full of berries. From Rampart Experiment Station I also received some flower seeds, two kinds of poppies, pansies, candytuft, phlox, mignonette, and nemophila. All bloomed and did fine, and sweet peas were very successful. The ground I cleared was heavy timber. I began cutting off the timber about March 25. April 28, I began planting lettuce, radishes, and kale, and I continued to plant as fast as I could dig the stumps out and the moss off. I dug up and planted 1½ acres. About half an acre is on the bottom land and the other on the south slope of a hill. The bottom land is sandy and gets warm quick. The hill land is a brown heavy loam. The bottom land outgrew the hill land in the early part of the season, but the hill crop stood the drought best and outgrew the sandy bottom land. My garden was very uneven owing to recent clearing, and when I burned brush during the summer every place where I burned a pile grew large crops, and where the fire would not burn at all and the moss was left I had scarcely anything. But I am well satisfied, as it is my first year and with no fertilizer.

Amund Anderson, Squaw Harbor, February 10, 1908.—I planted radishes, French Breakfast and Early Scarlet. June 1 and every 10 days thereafter until July 31, and they matured in 5 weeks. Splendid results. Lettuce, Simpson Early Curled and Morse, were planted in boxes indoors May 1, and transplanted June 7 in the garden. The first gave very fine results, but the other failed to head; nevertheless, we used them and found them excellent. Turnips and ruta-bagas did not do as well as I expected; the largest ones measured about 5 inches through. Cabbages, Early Winningstadt, planted in boxes about May 1 and transplanted June 10, took root at once and looked very thrifty, but owing to almost continued rain and cold during the summer they did not head, consequently the result was a failure. Cress (peppergrass) planted in garden June 3 and made the first cutting on July 10. Excellent result. Kale, Dwarf Green Curled, planted in boxes about May 25 and transplanted June 1, took root immediately and did very fine. Carrots, beets, parsley, and broccoli gave very poor returns. The nursery stock you sent me did very well, except the raspberries, none of which showed any sign of taking

root. The experiments made have shown me what I think are the principal causes of failure, i. e., inexperience in gardening, poorly prepared soil, and insufficient fertilizer.

Mort Galvin, Point Retreat Light Station, October 19, 1908.—Early Jersey Wakefield cabbage seeded indoors March 1, removed under glass outdoors April 20, and transplanted in open ground May 20, commenced to head middle of July and had big heads by August 10. Celery, White Plume, seeded in the same manner, set out in rows June 10, did not do well. Parsley, Moss Curled, seeded indoors March 1, came up April 5; made poor growth; set out July 1. It seems to be doing better now than at any time. California poppies seeded in the open ground April 15, came up May 1, bloomed early in July, and made lots of flowers. Nemophila seeded in open ground April 15, commenced to flower June 20, spread out and made an abundance of flowers, is blooming yet. Pansy, seeded indoors March 1, germinated on March 15, set out May 20, bloomed early in July. Several other flower seeds did well, but others did not bloom. Radishes, seeded April 20, came up May 1; did well the first planting, but those planted in May were attacked by maggots before they were fit for use. Lettuce, Passion, seeded April 20; commenced to use it June 15; made a heavy growth. Carrots, Chanteuay, seeded April 20, came up May 6; did well; made large roots. Parsnips, Hollow Crown, seeded April 20, did not come up till the end of May; most seed failed, though what did come up did well; made poor growth till August 1; grew to medium size. Onion, Yellow Danvers, seeded April 20; the few that were left were pulled a few days ago, and they were of more than medium size. Several other seeds you sent, such as beets, rhubarb, and ruta-baga, all did well, just the same as anywhere else, but the early turnips all seemed to fall a prey to maggots before maturing to any size.

Alex. Friedolin, Afognak, October 8, 1908.—I had better potatoes than last year and finished digging yesterday three-quarters of a ton. The turnip, Petrowski, is the best of those you sent me to try. The island turnip is subject to ravage by worms, as at Sitka. I have raised in boxes at home plants of cabbages, onions, flowers, and cucumbers, from Siberia (Tobolsk Province), but, as I lacked the time to accustom them to the outside air before planting, they came to nothing. The black currant bushes sent me had a few berries for the first time, but none ripened. Raspberry bushes bore flowers the second season, but no berries. Apple trees are becoming more vigorous, but cherries and plums died.

Mr. and Mrs. T. H. Jarmy, Comet, September 6, 1908.—We are pleased to report that of the seeds you sent us the cabbage, turnips, lettuce, ruta-bagas, radishes, cauliflower, beets, peas, carrots, rhubarb, and parsley have all done fairly well, but the Brussels sprouts, beans, spinach, and onions were a total failure.

M. Madison, Shelter Island, November 7, 1908.—We were too late the last season to mention anything except some potatoes we got from Behrend's store. They did all right. This last spring we planted from the same seed about May 10. They were ready about July 10; some measured 5 or 6 inches. We got another kind of potatoes from Douglas and planted them about May 20. They were very slow; only made small and uneven potatoes. We had some Early Rose, which did fine. I counted 56 potatoes in one hill last year. Some were left in the ground over winter and we left them standing until fall, and were surprised to find a big pile of fine potatoes in September. We had one 8 inches long, all from the first-mentioned seed. It looks to me like potatoes will grow where nothing else will, but that they prefer coarse sandy soil. Radish seed was planted May 15 in sandy soil. They made roots from 1 to 3 inches in diameter, but in black, wood-mixed soil made nothing but hard stems

and flowers. Of our ruta-bagas the largest was 12 inches high and 8 inches in diameter. Turnips, the largest was 10 inches in diameter, fine flavor. Kohl-rabi, we did not know what it was; it made about 6-inch heads on some, others only made big flowers. Later all made big tops about 6 feet high. Cabbage, only a few made heads. We planted some cabbage May 15 on the beach bank. Only those nearest the beach were any good. Then we planted some where the stumps were pulled, in fine black soil, but they did not make anything. On the sandy soil we planted about May 20. Weather was too dry; all died but a few; these recovered about three weeks later; the largest one was about 10 inches in diameter; solid heads. Beets and carrots made the best growth in sandy soil. Onions did not do anything. We applied plenty of fish fertilizer, but the sparrows picked it all off. Last season was very unfavorable for crops. Spring was too dry. I hope next season will be better. The flowers all made fine blossoms from July to last of October. I believe many things will grow here as well as anywhere if only you know how to plant. The largest potato tops were 6 feet high; 24 stems from one Early Rose potato seed. I am a native of Norway, but have been in Alaska since 1902. I am glad the Department of Agriculture is working in the Alaska wilderness. This will be a valuable country when once settled with industrious citizens.

Andrew Johnson, Fairbanks, September 5, 1908.—I received your vegetable seed and gave it a trial. The ruta-bagas have grown large and not very smooth, as they seem to have a great many roots to them. Turnips did fine, but the carrots seem to do the best. Parsnips have got very fine roots. The beets seem to go to seed. Everyone says their beets go to seed, although I have some that are very good. Beans are wonderful, the vines being full, and we have used string beans since August 8. Peas did well. We planted our seed May 20. I also planted potatoes on that date. I had no choice seed, but planted some shipped in for use. Last year I planted 60 pounds Carman potato and I got 1,500 pounds, and they were dry and kept fine till the last of June. We planted 400 pounds this spring, but have not gathered them yet. The frost has not hurt them this year, but last year (1907) it killed everything, black to the ground, on August 27. We have cabbages that weigh 8, 9, and 10 pounds which were set out May 28, and I have cauliflowers that weigh 6 and 7 pounds each. Tomatoes grow to be great trees but do not bear much fruit. I planted rhubarb and transplanted the 1st of June; the plants look hardy. I will try to keep them from freezing this winter. Jersey Wakefield cabbage does the best for us. The soil here is sandy. We are located on a homestead on the banks of the Tanana River, 18 miles from Fairbanks.

H. Buzby, Fairbanks, December 2, 1908.—In June, 1907, I received from the Sitka Experiment Station 2 white and 2 red currant roots, 6 red raspberry roots, 2 Whitney apple, 2 Duchess, 1 strawberry apple, and 1 plum seedling tree. I placed them in good ground, as I reported to you one year ago. Last spring 2 of the currants, 2 of the raspberries, both of the Whitney apple, both of the Duchess apple, and the plum seedling came up from and around the roots. They made a fair growth, from 10 to 20 inches. The others were evidently winterkilled. The summer was drier than I have seen in Alaska in the two seasons I have lived here. I did not water any of the trees or roots or give them any particular protection in the winter except a little mulch of hay, as I supposed the idea is to test them fully. I believe they will live and we may raise apples. If you could start some nursery stock on the experiment farm here, I think it would be a great help to those of the Tanana Valley, as we could plant our trees at the proper time, May 1 to 10. The dry weather in June, July, and August shortened our crops somewhat, but the quality was better on old ground that has been cultivated. This ground, which has been

cultivated for four years, produces threefold more than ground cultivated for two years under the same conditions. We raised a full line of vegetables, roots, oats, barley, and wheat, and some timothy for seed. First killing frost was September 1. I must mention, especially, some Eureka potatoes, seed from William Henry Maule, of Philadelphia, supposed to be pure, planted May 9, 1908, on good ground cultivated since 1904. Dug a few for dinner July 4 that were $7\frac{2}{3}$ inches in circumference. The patch was dug and weighed on August 25, and it yielded 42 pounds for each pound of seed planted; quality excellent, about 90 per cent marketable, and in size about three times larger than the seed when received. At this date they are crisp and beautiful, the best looking potatoes I have ever raised.

WEATHER REPORTS FOR ALASKA.

The special agent has had charge of the weather service in Alaska during the past year as in former seasons. Condensed monthly data are given herewith. It is a matter of regret that the regular daily observations, if published in full, would make this report too bulky, and for this reason only the principal data for each month are published, namely: The highest temperature reached, the lowest temperature reached, the average temperature, and the precipitation for each month are given, and to still give a better idea of the nature of the weather its character is indicated by the number of clear, partly cloudy, and cloudy, or rainy days in each month.

Condensed meteorological reports.

SITKA: Lat. 57° 3′, long. 135° 20′. R. W. De Armond, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1907.	°F.	°F.	°F.	*Inches.*				
December	50	23	37.19	4.81	1	13	17	19
1908.								
January	47	22	35.54	7.54	2	4	25	23
February	50	18	35.41	6.57	8	8	13	13
March	52	19	36.49	4.74	8	8	15	16
April	61	21	39.26	9.58	1	6	23	24
May	65	30	44.85	3.82	7	7	17	23
June	66	36	50.86	1.39	7	5	18	8
July [a]	72	40	54.25	3.45	6	5	17	18
August	74	41	54.96	7.52	8	5	18	20
September	64	32	48.41	15.86	1	9	20	30
October	60	22	42.62	10.65	8	10	13	21

KENAI: Lat. 60° 40′, long. 151° 10′. James W. Gray, observer.

1907.								
December	40	−27	17.99	.....	7	1	23	3
1908.								
January	40	−28	17.91	.....	3	.....	28	8
February	46	−25	21.44	.....	14	.....	15	9
March	45	−14	23.37	.....	15	.....	16	7

[a] Observations taken for 28 days in July, 1908.

Condensed meteorological reports—Continued.

COPPER CENTER: Lat. 62°, long. 145°. Chas. W. H. Heideman, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1907.	°F.	°F.	°F.	*Inches.*				
December	26	−42	−1.61	0.35	5	14	12	2
1908.								
January	44	−45	2.75	.45	9	.....	22	3
February	42	−33	8.82	.25	16	2	11	2
March	44	−34	11.69	.05	16	.....	15	1
April	48	4	29.38	.10	25	3	2	3
May	65	22	40.30	.13	28	.....	3	2
June	76	27	50.75	.27	17	.....	13	4
July	76	25	51.07	1.83	16	.....	15	4
August	67	29	48.88	.65	16	1	14	8
September	60	3	36.58	.78	9	.....	21	4

RAMPART: Lat. 65° 30′, long. 150° 15′. J. W. Gasser, observer.

1907.								
December	11	−48	− 7.16	1.26	6	4	21	13
1908.								
January	16	−61	−17.33	1.08	13	9	9	11
February	30	−43	− 1.74	.52	10	4	15	6
March	47	−42	4.96	.81	13	6	12	10
April	62	14	23.49	.58	22	2	6	4
May	72	23	46.29	.82	13	10	8	9
June	80	33	58.64	1.38	20	9	1	9
July	87	39	60.05	1.13	.....	.....	.....	8
August	81	29	55.38	.46	8	5	18	6

FORTMAN SALMON HATCHERY, LORING: Lat. 55° 20′, long. 131° 40′. Fred. Patching, observer.

1907.								
December	54	23	35.25	16.28	2	12	17	27
1908.								
January	42	15	32 03	14 68	3	12	16	21
February	44	10	31 75	6 86	2	16	11	18
March	48	9	34 72	9.55	10	10	11	21
April	67	27	39.1	14.94	.....	17	13	29
May	72	28	46 60	8 99	3	19	9	24
June	76	33	53.81	5 34	1	23	6	18
July	83	41	56 85	6 52	5	16	10	21
August	78	39	56 52	5 09	11	15	5	18
September	59	33	48 35	24 89	.....	11	19	29
October	59	15	41.24	19. 50	7	12	12	23

WRANGELL: Lat. 134°, long. 56°. Geo. C. L. Snyder, observer.

1908.								
May	68	33	48. 46	3. 18	7	8	16	21
June	73	40	55. 38	2. 37	10	14	6	14
July	83	44	58 44	2 81	11	7	13	17
August	80	44	59. 10	3 61	9	6	16	10
September[a]	64	34	50 19	15 98	1	2	27	26
October	50	20	38. 26	2. 34	11	5	15	15

[a] Maximum observations taken for 19 days in September, 1908.

Condensed meteorological reports—Continued.

JUNEAU: Lat. 58° 20′, long. 134° 30′. I. J. Sharick, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1907.	°F.	°F	°F.	*Inches.*				
December	48	28	39.35	0.95	4	.....	27	11
1908.								
January	45	27	35.98	.39	4	.....	27	13
February	46	15	33 85	3 87	6	.....	23	20
March	48	8	32 95	6 59	0	.....	22	9
April	62	30	41. 4	5.88	10	1	19	30
May	67	33	48 51	4 88	12	.....	19	17
June	84	40	54 73	2 45	10	.....	20	3
July	86	42	56 93	2 80	11	.....	20	8
August	69	40	53 14	3 85	7	.....	24	12
September	55	41	47 40	17.00	.....	.....	30	30
October	46	25	40.07	8.40	3	.....	28	25

SKAGWAY: Lat. 59° 5′, long. 135°. H. D. Clark, observer.

1907.								
December	44	15	30. 33	2. 99	4	14	13	11
1908.								
January	42	10	29. 35	1. 42	3	10	18	8
February	44	8	27. 73	1. 70	12	6	11	6
March	44	1	28. 59	.23	14	11	6	2
April	60	24	39 73	.80	3	21	6	5
May	69	27	48. 62	.70	9	18	4	3
June	81	33	56. 27	.11	5	23	2	2
July	83	37	56. 45	.48	9	18	4	2
August	74	37	56. 99	.49	6	19	6	3
September	65	32	47 63	4. 18	1	13	16	11
October	54	17	36. 09	2. 46	9	14	8	8

KLUKWAN: Lat. 59° 25′, long. 136°. F. R. Falconer, observer.

1908.								
February[a]	41	9	27. 77	0. 57	3	2	4	3
March	44	−3	25 60	.66	14	4	13	5
April	55	21	38 40	.58	2	12	16	5
September[b]	56	30	42. 19	2. 37	.....	3	12	11
October	53	0	32. 83	2. 38	12	5	14	14

KILLISNOO: Lat. 57° 30′, long. 134° 30′. Joseph Zuboff, observer.

1908.								
March	46	12	32 67	0. 64	8	10	13	9
April	55	28	40 06	2. 28	1	14	15	14
May	68	30	47. 65	1. 55	18	6	7	2
June	72	36	52. 54	.97	16	3	11	4
July	73	40	54. 10	2. 29	5	6	20	14
August	66	40	53. 52	2. 54	2	10	19	11
September	58	33	46 29	8. 95	.....	4	26	26
October	55	20	38. 70	7. 90	7	9	15	20

CALDER: Lat. 55° 08′, long. 133° 27′. Neil Walker, observer.

1908.								
April	67	28	39. 75	12. 35	1	5	24	29
May	69	28	44. 57	5. 00	9	8	14	21
June	73	33	50. 40	2. 77	7	6	17	14
July	73	37	53. 46	5. 20	8	6	17	18
August	65	37	52. 98	6. 60	9	6	16	16
September	59	29	47. 16	18. 83	3	6	21	26
October	54	16	39. 73	15. 43	13	5	13	19

[a] Observations taken for 9 days in February, 1908.
[b] Observations taken for 15 days in September, 1908.

Condensed meteorological reports—Continued.

KATALLA: Lat. 60° 11′, long 144° 34′. R. W. Moss, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1907.	°F.	°F	°F.	*Inches.*				
December	43	4	31.27	11.48	7	3	21	23
1908.								
January	40	12	30.93	11.88	6	2	23	27
February	42	7	29.99	3.94	12	3	14	18
March	45	6	29.45	4.54	15	2	14	14
April	49	12	34.93	8.00	6	9	15	21
May	62	28	41.80	7.75	14	7	10	16
June	67	37	48.98	4.22	9	12	9	12
July	62	36	50.46	8.20	5	5	21	21
August	66	40	51.12	7.93	14	1	16	17
September	62	28	43.33	18.38	8	4	18	22

ORCA: Lat. 60° 35′ long. 145° 41′. W. J. Shepard, observer.

1907.								
December[a]	45	10	29.65	15.00	4	25	2	21
1908.								
January	43	15	30.04	13.24	5	3	23	17
February	42	17	31.50	13.39	10	.....	19	16
March	47	11	32.29	9.58	14	3	14	9

FORT LISCUM: Lat. 61° 27′, long. 146° 27′. Lieut. L. H. Hanson, observer.

1907.								
December	42	− 1	26.11	7.13	6	4	21	19
1908.								
January	37	− 5	23.46	16.58	11	4	16	18
February	40	5	26.63	7.22	16	3	10	12
March	39	2	26.72	6.58	18	2	11	12
April	46	17	32.53	3.56	18	3	9	8
May	60	31	43.07	.....	24	5	2	.....
June	70	40	53.42	.79	18	6	6	3
July	69	33	52.70	2.19	11	13	7	9
August	73	30	45.48	3.35	4	18	9	14
September	62	17	39.98	6.00	2	18	10	14
October	50	11	31.5	8.56	12	12	7	15

SEWARD: Lat. 60° 1′, long. 149° 30′. W. A. McNeiley, observer.

1908.								
February	42	9	30.56	10.43	8	4	17	16
March	45	15	32.14	2.35	14	3	14	9
April	53	23	38.01	4.00	12	4	14	16
May	65	32	44.51	1.63	14	5	12	12
June	80	36	50.98	.45	15	6	9	5
July	73	41	51.80	3.25	12	1	18	13
August	71	41	52.77	6.34	10	6	15	16
September	65	27	45.81	4.29	13	5	12	9
October	51	11	34.96	9.73	17	1	13	11

[a] Maximum observations taken for 20 days in December, 1907.

Condensed meteorological reports—Continued.

KODIAK: Lat. 57° 47′, long. 152° 20′. M. D. Snodgrass, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1907.	°F.	°F	°F.	Inches.				
December	46	3	30.88	6.50	7	2	22	13
1908.								
January	46	9	29.67	4.57	7	15	9	16
February	49	17	33.39	5.65	10	11	8	15
March	49	14	34.14	2.91	6	10	15	15
April	50	14	34.16	4.87	.....	16	14	17
May	58	26	40.43	6.05	1	16	14	27
June	78	30	48.68	1.63	5	15	10	9
July	69	35	48.80	6.64	.....	12	19	21
August	73	35	51.98	7.04	7	13	11	16
September	77	27	45.66	3.82	3	20	7	15
October	54	18	37.84	6.91	7	11	13	13

SUNRISE: Lat. 60° 54′, long. 149° 35′. A. Lawson, observer.

1907.								
December	41	−14	20.29	6.78	6	4	21	19
1908.								
January	42	−17	19.85	7.03	4	4	23	21
February	42	− 8	23.96	4.68	11	3	15	12
March	40	− 2	24.01	2.00	12	5	14	12
April	51	16	32.29	3.37	6	10	14	14
May	66	27	42.87	2.63	9	10	12	12
June	79	30	50.29	.21	15	4	11	5
July	70	36	52.49	2.28	7	10	14	12
August	70	35	50.86	2.91	5	6	20	21
September	60	17	40.71	5.00	10	4	16	16
October	53	2	29.24	2.59	16	1	14	14

TYONOK: Lat. 61° 10′, long. 151° 40′. E. Fay Woolsey, observer.

1907.								
November	44	3	25.48	2.18	9	4	17	10
December	40	−19	20.83	.57	5	1	25	6
1908.								
January	36	−20	20.72	1.98	5	3	23	10
February	42	− 2	23.93	.99	11	3	15	7
May	67	30	45.38	.39	6	10	15	2
June	81	36	52.33	.25	13	11	6	1

COAL HARBOR: Lat. 55° 24′, long. 160° 49′. Henry S. Tibby, observer.

1907.								
November	46	16	32.59	5.08	3	11	16	14
December	40	7	28.17	2.28	8	10	13	10
1908.								
January	42	4	28.01	6.06	3	11	17	20
February	43	16	33.44	5.61	8	11	10	15
March	45	4	31.40	4.20	5	13	13	10
April	46	10	29.33	.....	10	11	9	12
May	51	25	38.41	6.79	4	10	17	11
June	68	33	46.70	3.57	4	11	15	8
July	70	42	51.09	3.66	4	11	16	14
August	66	38	51 81	12.86	.....	15	16	9
September	75	33	47.96	31.10	.....	13	17	12

Condensed meteorological reports—Continued.

DUTCH HARBOR: Lat. 53° 54′, long. 166° 32′. F. Schroeder, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1907.	°F.	°F.	°F.	*Inches.*				
November	47	22	34.21	10.82	1	7	22	21
December	41	12	30.02	7.27	3	4	24	24
1908.								
January	43	12	28.19	8.01	3	7	21	24
February	44	24	32.42	4.80	4	10	15	21
March	43	13	30.30	1.85	.....	14	17	15
April	40	20	29.98	3.87	1	7	22	25
May	48	23	38.07	3.69	2	11	18	17
June	61	36	45.56	2.67	2	7	21	12
July	58	38	48.44	2.71	.....	4	27	10
August	76	35	50.33	5.59	5	5	21	11
September	76	35	46.86	6.85	1	17	12	16

KETCHEMSTOCK: Lat. 64° 15′, long. 142° 20′. Michael Doran, observer.

1907.								
November[a]	.....	−43	.....	0.40	12	1	17	3
December[a]	.....	−47	.....	.25	6	.....	25	1
1908.								
January[a]	.....	−53	.....	.....	17	.....	14	.....
February[a]	.....	−47	.....	.....	15	.....	14	.....
March[a]	.....	−57	.....	.41	12	.....	19	2
April[a]	.....	−29	.....	.40	12	.....	18	1
May[a]	.....	20	.....	1.78	5	5	21	5
June[a]	.....	29	.....	1.77	9	1	20	11
July[a]	.....	27	.....	2.30	15	16	.....	11
August[b]	67	22	47.09	2.22	16	.....	16	7
September[c]	58	4	34.07	1.35	9	.....	18	5
October[d]	46	−30	22.70	5.00	17	.....	12	3

NORTH FORK: Lat. 64° 30′, long. 142° 10′. Fred. E. Steward, observer.

1907.								
November	35	−47	− 3.25	0.20	20	1	9	1
December	22	−52	−16.19	.20	22	3	6	2
1908.								
January	32	−49	−17.96	.....	23	6	2	.....
February	37	−48	− 8.43	.....	16	13	.....	.....

FORT EGBERT: Lat. 64° 49′, long. 141° 12′. John A. Guslafson, observer.

1907.								
November[e]	.....	−39	.....	0.49	14	.....	16	2
December[e]	.....	−54	.....	.31	.....	.....	31	4
1908.								
January[e]	.....	−48	.....	.12	14	.....	17	2
February[e]	.....	−51	.....	.....	20	9	.....	.....
March[e]	.....	−50	.....	.....	11	20	.....	.....
April[e]	.....	−20	.....	.10	13	.....	17	1
May[e]	.....	23	.....	1.02	16	.....	15	4
June[e]	.....	31	.....	2.16	.....	.....	.....	8
July[e]	.....	32	.....	2.47	11	2	18	6
August	80	27	52.3	1.02	18	.....	13	6
September	68	2	36.45	1.48	10	.....	20	9
October	50	−21	18.33	.18	16	.....	15	3

[a] No maximum temperature taken from November, 1907, to July, 1908, inclusive.
[b] Maximum temperature taken for 19 days in August, 1908.
[c] Observations taken for 27 days in September, 1908.
[d] Observations taken for 29 days in October, 1908.
[e] No maximum thermometer.

Condensed meteorological reports—Continued.

CIRCLE CITY: Lat. 65° 41′, long. 144°. Geo. H. Mills, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1907.	°F.	°F.	°F.	Inches.				
December[a]	6	−38	−11.55	0.63	3	2	22	3
1908.								
January[b]	24	−57	−18.73	1.23	18	5	5	5
February	27	−40	− 8.51	.25	19	2	8	2
March[c]	38	−53	− 5.08	.76	15	4	11	4
April[d]	54	−29	19.33	1.45	13	1	7	2
May[e]	67	23	45.71	.29	19	7	4	1
June[f]	82	34	58.53	.20	21	6	1	3
July[g]	84	41	61.07	.87	11	10	7	12
August[h]	82	30	54.57	1.08	12	8	6	7
September[i]	61	5	35.66	2.21	7	.....	18	8

ALLAKAKET: Lat. 66° 45′, long. 151° 10′. Clara M. Carter, observer.

1907.								
December	18	−52	−12.00	0.81	18	1	12	13
1908.								
January	22	−66	−20.49	1.00	14	8	9	12
February	25	−45	− 4.29	.67	7	8	14	16
March	38	−53	− 5.88	.81	17	7	7	10
April	47	−27	+16.53	.34	21	5	4	5
May	66	20	42.80	.44	13	16	2	9
June	85	32	54.75	.38	13	16	1	7
July	83	33	57.65	1.92	4	22	5	9
August	74	25	51.36	.80	1	24	6	12

FAIRBANKS: Lat. 64° 50′, long. 148° 9′. Isabel M. Emberly, observer.

1907.								
December	20	−36	− 3.53	.....	11	3	17	9
1908.								
January	32	−51	−11.33	.....	16	2	13	7
February	38	−32	2.66	.....	19	1	9	3
March	36	−35	5.22	.....	18	1	12	8
April	55	−19	26.05	0.03	20	6	4	4
May	74	30	48.59	.52	17	13	1	7
June	83	35	58.24	.96	14	16	.....	10
July	79	40	59.92	.73	14	9	8	11
August	80	31	54.25	.71	14	11	6	14
September	64	15	37.76	1.57	9	10	11	12

[a] Observations taken for 27 days in December, 1907.
[b] Observations taken for 28 days in January, 1908.
[c] Observations taken for 30 days in March, 1908.
[d] Observations taken for 21 days in April, 1908.
[e] Observations taken for 30 days in May, 1908.
[f] Observations taken for 28 days in June, 1908.
[g] Observations taken for 28 days in July, 1908.
[h] Observations taken for 26 days in August, 1908.
[i] Observations taken for 25 days in September, 1908.

Condensed meteorological reports—Continued.

FORT GIBBON: Lat. 65°, long. 151°. Charles B. Murphy, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1907.	°F.	°F.	°F.	*Inches.*				
November[a]		−37		0.03	11	1	18	3
December[a]		−50		.31	7	18	6	5
1908.								
January[a]		−60		.23	11	4	16	3
February[a]		−35		.26	4	10	15	4
March[a]		−50		.90	14	5	12	10
April[a]		−11			17	8	5	
July[b]	89	34	62.29	.96	9	8	14	4
September[c]	48	9	31.53	1.60	10	3	17	8

HOLY CROSS MISSION: Lat. 63° 28′, long. 160°. Brother Constantine, observer.

1907.								
November	31	−18	4.26	0.51	8	4	18	4
December	32	−13	− 3.06	.40	9	6	16	3
1908.								
January	35	−25	− 4.95	.86	9	6	16	2
February	36	−30	14.15	1.13	8	4	17	5
March	42	−25	11.25	.21	15	3	13	4
April	50	− 3	21.91	.09	9	7	14	3
May	67	25	42.51	.17	7	14	10	
June	81	31	56.80	.30	19	9	2	2
July	76	34	56.62	1.98	13	7	11	8
August	67	33	50.59	1.83	7	6	18	7

NOME: Lat. 64° 30′, long. 165° 24′. A. A. Gibson, observer.

1907.								
December	34	−28	4.64	0.30	12	1	18	7
1908.								
January	32	−32	− .08	.43	14	5	12	6
February	31	−28	13.79	.76	4	2	23	9
March	34	−29	7.29	1.19	10	2	19	10
April	40	−12	13.63	.02	19	3	8	1
May	60	20	37.50	.19	11	4	16	3
June	78	30	46.18	.90	17	4	9	5
July	77	40	51.19	2.10	8	5	18	10
August	60	32	47.22	2.92	2	7	22	13
September	50	19	35.51	.52	12	9	9	5

BLACK POINT: Lat. 64° 51′, long. 165° 15′. F. F. Miller, observer.

1908.								
July[d]	81	35	52.32	2.30	4	5	14	10
August[e]	60	27	45.69	3.42	2	17	11	20
September[f]	54	6	36.22	.63	11	6	7	6

[a] Maximum observations not taken from November, 1907, to April, 1908, inclusive.
[b] Maximum observations taken for 28 days in July, 1908.
[c] Maximum observations taken for 12 days in September, 1908.
[d] Observations taken for 28 days in July, 1908.
[e] Observations taken for 30 days in August, 1908.
[f] Observations taken for 24 days in September, 1908.

Condensed meteorological reports—Continued.

CANDLE: Lat. 66°, long. 161° 90′. J. E. Fox, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1907.	°F.	°F.	°F.	Inches.				
November [a]	43	−22	2.63	.....	12	4	6	.....
December	27	−43	−3.09	.....	12	9	10	.....
1908.								
January	33	−53	−12.75	.....	18	5	8	.....
February	32	−30	4.50	.....	10	11	8	.....
March [b]	32	−30	5.06	.....	1	3	4	.....

IRON CREEK: Lat. 65°, long. 164° 39′. Clyde Hager, observer.

1908.								
June [c]	89	34	61.66	.....	9	.....	.....	.....
July	82	34	54.01	1.67	20	.....	11	6
August [d]	64	26	48.19	1.27	7	1	22	7
September [e]	54	4	35.41	.30	20	2	6	2

NIZINA: Lat. 61°, long. 142° 20′. Geo. M. Esterly, observer.

1908.								
April	61	0	29.53	0.90	24	5	1	.....
May [f]	70	24	44.25	.....	6	13	12	.....
June [g]	.....	31	.....	.....	.....	.....	.....	.....
July [g]	.....	30	.....	.....	.....	.....	.....	.....
August [g]	.....	31	.....	.....	.....	.....	.....	.....

SOLOMON: Lat. 64° 33′, long. 164° 24′. D. J. Wynkoop, observer.

1908.								
January [h]	40	−26	13.90	.....	1	3	7	.....
February [i]	34	−24	7.11	.....	5	4	9	.....
March [j]	41	−32	7.11	.....	11	4	11	.....
April [k]	43	−12	11.68	.....	7	10	8	.....
May [l]	54	16	35.77	.....	6	19	4	.....
June [m]	80	32	47.50	.....	14	8	6	.....
July [n]	75	38	53.41	.....	3	8	13	.....

[a] Observations taken for 22 days in November, 1907.
[b] Observations taken for 8 days in March, 1908.
[c] Observations taken for 9 days in June, 1908.
[d] Observations taken for 30 days in August, 1908.
[e] Observations taken for 28 days in September, 1908.
[f] Maximum observations taken for 20 days in May, 1908.
[g] Maximum observations not taken for June–August, 1908; no thermometer.
[h] Observations taken for 11 days in January, 1908.
[i] Observations taken for 18 days in February, 1908.
[j] Observations taken for 26 days in March, 1908.
[k] Observations taken for 25 days in April, 1908.
[l] Observations taken for 29 days in May, 1908.
[m] Observations taken for 28 days in June, 1908.
[n] Observations taken for 24 days in July, 1908.

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